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AUTOMOTIVE INDUSTRIES

VOLUME 63 SEPTEMBER 6, 1930 NUMBER 10

Foreign Assembly Plants Account for Almost Half American Sales Abroad

Approximately 75 per cent of cars sold outside U. S. and Canada had part of building done in country where sold, or in neighboring country + + +

Growth marked in first six months of current year

By A. Burdet Crofoot

DURING the first half of 1930, there has been a marked increase in the percentage of American designed automobiles sold in the export market that were either partially or wholly assembled outside of this country. Approximately three-fourths of the cars sold abroad during this time had at least a part of their building done either in the country where sold, or in a neighboring country. This compares with an average over the past seven years of about 60 per cent. As a matter of fact, the number of cars assembled abroad during the first six months of the current years falls within 25 per cent of the total number of cars shipped abroad complete during the entire year 1929. This foreign assembly varies from the mere putting together of cars shipped from the American factory in a knocked-down condition to the complete building of the car abroad as is done in England by Ford.

Perhaps of even greater interest, in view of

Table I—Comparison of Assembly and Production of American Cars Overseas

Year	Overseas Assembly	Canadian Production	Total Foreign Output Finished Cars	Export Finished Cars	Total Foreign Sales	Percentage Foreign Finished Cars	Percentage Overseas Assembly
1923	106,110	146,438	252,548	128,967	381,515	61.3	27.8
1924	142,346	135,246	277,592	150,780	428,372	64.8	33.3
1925	178,994	161,970	340,964	249,673	590,637	57.8	30.2
1926	168,246	204,727	372,973	224,647	597,620	62.4	28.2
1927	211,056	179,054	390,110	255,328	645,438	60.4	32.6
1928	229,743	242,382	472,125	352,988	825,113	57.2	26.5
1929	354,929	263,295	618,224	378,887	997,111	62.	36.1
1930 (6 mos.)	175,686	110,685	286,371	100,446	386,817	74.	45.4

Table II—Percentage of Foreign Operations

Year	Overseas Assembly	Sales Outside United States and Canada	Percentage Overseas Assembly
1923	106,110	304,997	34.8
1924	142,346	349,781	40.7
1925	178,994	502,854	35.7
1926	168,246	467,217	36.
1927	211,056	523,798	40.3
1928	229,743	662,119	34.6
1929	354,929	835,527	42.5
1930 (6 mos.)	175,686	299,595	58.6

the fact that many of the manufacturers consider the output of their Canadian plants as a part of their domestic production, assemblies outside of the United States and Canada reached nearly 50 per cent of the total sales outside the United States, but including sales in Canada, during the first half of 1930. This compares with foreign assemblies of one-quarter to one-third of this market in past years.

Overseas Terminology

Before proceeding further with a discussion of these facts it would be well to establish a definite understanding of terms used. The Department of Commerce, in its tabulations, considers grand total foreign assemblies as cars on which some work is done in the countries outside United States and Canada. For the purpose of this discussion this figure is found in the column headed Overseas Assemblies in Table I. Canadian output is considered separately by the Department of Commerce but in Table I is added to the Department's figures for foreign production to give an accurate picture of the total volume of production on which some work is done outside the United States. This figure is found in the column headed Total Foreign Output Finished Cars. Sales in Canada are also considered in the foreign sales in the column headed Total Foreign Sales. Next to the last column in this table shows the percentage of total foreign output of finished cars to the total of foreign sales, including Canada in both cases. The last column shows the percentage of overseas assembly, exclusive of Canadian production, to the total foreign sales including sales in Canada.

For the benefit of those manufacturers who consider Canada as a part of the domestic market, Table II shows the percentage of cars sold outside the United States and Canada that were also assembled outside these two countries. This, as will be noted, again demonstrates that during the first six months of the current year there has been a marked increase in overseas assemblies.

Reasons for this tendency are not far to seek. For one thing there is the lowered cost of shipment of a knocked-down car, or of parts, as compared with the cost of shipping the completed car. Then there is the factor of labor costs in most of the foreign markets which materially affects the delivered price of the car. Many manufacturers also point to the fact that by employing local labor in these various foreign markets they are increasing the wealth of that country and thereby increasing the potential market in that country to a certain extent. An increasingly important factor at present is the rapidly rising tariff barrier being raised by many European countries as well as in other parts of the world, and which usually bears more heavily on the completed car than on parts. In order to surmount this barrier, manufacturers are not only doing as much of the work abroad as possible but in many instances are even buying as many of the parts there as they can.

This has resulted in varying degrees of overseas assembly by various manufacturers, depending to a large extent on the importance of the individual market to the manufacturer. Thus we have Ford's European activities where the whole car is made and assembled in England and on the Continent. There are also the Willys Crossley and the Chevrolet operations in England, where the car is built almost in its entirety by British labor using British parts to a very large extent. In Australia, due to the high tariff wall that has been in existence there for some time, very little of the American car sold has anything American in it outside the frame, engine and design. Bodies, tires, accessories and labor are almost entirely Australian. Mention may also be made of the Opel Works in Germany and the Vauxhall Works in England, both of which, through ownership by General Motors, employ American capital, but both of these are European designed cars and neither can exactly be classified as an American automobile.

Canadian Operations

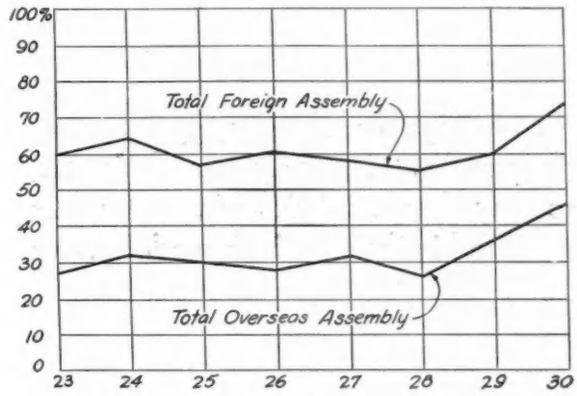
Many of the operations carried on in Canada also represent a very large percentage of foreign expense in the production of cars. Many of these plants are, of course, so close to the American plants, and shipment back and forth of the materials is relatively such an easy matter that it would be hard for any manufacturer to attempt to state how much of the money spent for Canadian producion is actually spent in Canada and how much in the United States. It goes without saying, however, that this represents a large amount of expenditure outside of the United States both for labor and for materials.

As opposed to this, we have other countries where the car is practically completed in the American factory and shipped knocked-down for final assembly in the country where it is to be sold. Because of the wide divergence in the policy of the various manufacturers, and in the requirements of the various markets, it is impossible to arrive at any exact idea as to what percentage of the cost of the car sold abroad is spent

here and what percentage is spent in the market itself. In some of the cases mentioned the money actually spent abroad will run pretty close to 100 per cent, while in others it will be comparatively negligible.

Where this situation most vitally affects the American industry, possibly, is in its effect on American labor, both in the automotive industry itself and the parts industry. Many of those who have "viewed with alarm" the various attempts in foreign countries to curb the increasing popularity of American cars, point to the last year's figures, when approximately 20 per cent of our production was sold in foreign markets. They say, in effect, that if our export market is cut in half by these various efforts there will necessarily be a curtailment of 10 per cent in the somewhat more than 4,000,000 persons employed directly or indirectly in the automotive industry in this country. While it would be foolish to say that American labor employed in the automotive industry would not be materially affected by losses in the export market, the effect would not be so nearly disastrous as the above figures would indicate, because of the fact that so much of the labor, both direct and indirect, now employed in producing cars for our export market is already American, as well as British, Japanese, German, Polish, Malaysian, Hindu or South American.

As a matter of fact, the present tendency might almost cause some alarm in the reverse direction. Admittedly, our domestic plants are geared to produce more cars than our domestic market can absorb for some time to come. With the increasing tendency to produce cars for foreign markets in these countries themselves, more of the money spent in their production is obviously being spent in these foreign countries, with the result that it is being taken away from the American laborer. How far this tendency will go, it is impossible to state, but economic and not political considerations seem likely to be the final determining factor.



Relation of exports of cars to the total number assembled

Instead of dangers arising from foreign tariff barriers, resulting in curtailment of domestic output, the alarming note is sounded from another direction + +

With the increasing tendency to produce cars for foreign markets in foreign countries, the money spent in these countries appears to be taken from the American side of the production program + +

However, all of the increase in overseas assembly operations in the past year has been made in plants in operation, indicating that this type of foreign work cannot have made serious inroads on domestic production + + + + + + +

Another item which must be borne in mind in discussing possibilities is the fact that Ford and Willys Crossley have been virtually manufacturing in England for some time, and any increase in their overseas operation would not affect labor in their American plants to any marked degree. Ford, of course, accounts for a very large portion of the overseas market just as he does for the American market, and it is doubtful if an increase in his overseas market would have any marked effect on his domestic operations. The further fact that all of the increase in overseas assembly during the past year or so has been made in plants which were already operating abroad indicates that this type of operation cannot have cut any very serious inroads into the domestic production. Furthermore, it must be remembered that to date overseas assembly operations have been carried on only in the lower and medium priced cars. All the high priced cars sold in the export market have been shipped abroad completely assembled in the American factory.

It seems probable that the condition noted for the first six months of this year will continue to a certain extent, and that there will continue for some time to be a wider and wider divergence between the curves for foreign assemblies and completed cars shipped abroad, but that for some time at least, this will have little effect on American manufacturing operations.

Theory of Evolution Applies to

As the high-wheeled buggy furnished "inspiration" to early car designers, so may characteristics of present cars be found in their ancient predecessors

By Herbert Hosking

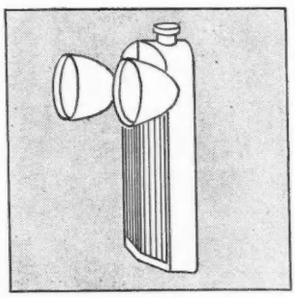
A QUARTER of an inch difference in the length of Cleopatra's nose would have changed the course of the history of the world. It is idle to claim that so little difference in the design of a passenger automobile's nose could affect the sales history of the manufacturing company, but the importance of hood and radiator-shell design has received new emphasis and a new trend with the announcement of a half-dozen new models by as many manufacturers.

Children of ten years ago played a game which was based on the ability to recognize the largest number of automobiles in competition with playmates. Ten years ago it was a comparatively simple matter to distinguish from each other all of the passenger cars manufactured. At the present time this distinction is increasingly difficult to make, despite the claims of manufacturers that designers of such and such a car have gone back to the Pyramids, or the classic Greek, for inspiration. One car is very like another. Difference in detail there may be by the underlying functional use of line and curve follows pretty much the same tendencies. These tendencies are found, usually, not in the Acropolis, or the tomb of Tut-Ankh-Amen, but in the design of a car which has caught the popular fancy and forthwith sold well.

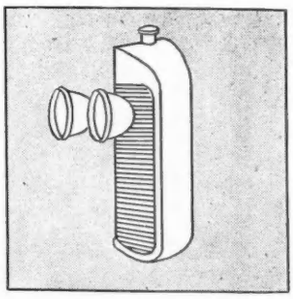
During the course of the automobile industry three general tendencies in radiator shell and hood design have influenced most of the passenger cars on the American market. All of these basis functional designs have been of foreign origin. Each of them has given birth to a whole series of imitations or adaptations by American manufacturers.

The three foreign cars cited are Fiat, Mercedes and Minerva. Twice in its history has Fiat designed a type of radiator shell which has found many plagiarists. This, then gives us four types of basis radiator shell design which have, at various times, influenced the trend in appearance of the same component of numerous American cars.

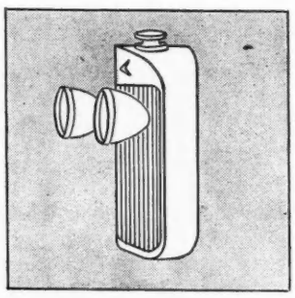
Geometrically, or shall we say, functionally, the designer of radiator



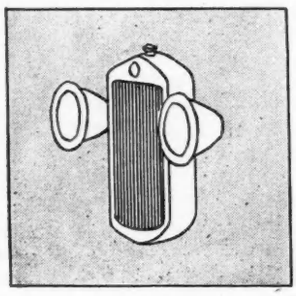
Sunbeam



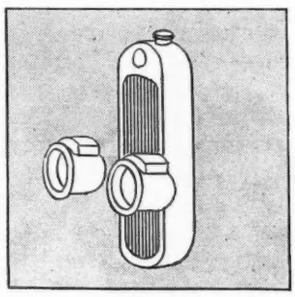
Owen-Magnetic



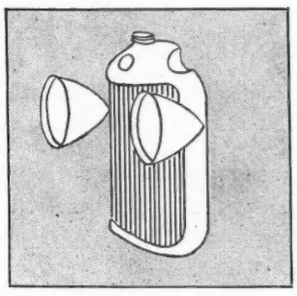
Mercedes-Benz



Fiat



Fiat

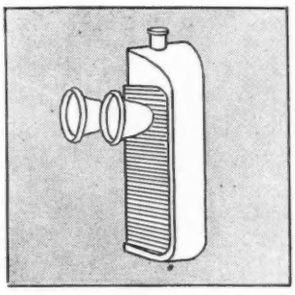


Minerva

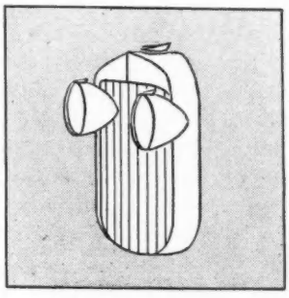
A group of foreign radiator types

Radiator Shells of Automobiles

This article presents some modern radiator designs and proceeds to show that they are the more or less lineal descendants of design types established in earlier models + + + +



Biddle



Graham-Paige

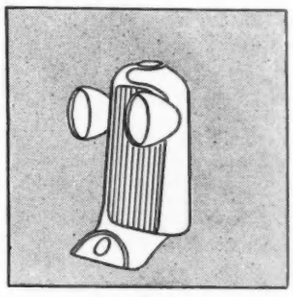
shells must work under certain fundamental limitations. So long as the majority of automobiles are propelled by water-cooled engines, requiring the circulation of a relatively large quantity of coolant; so long as streamlining of automobile bodies is of advantage mechanically; and so long as the conventions of appearance require a hood or bonnet for the engine, then the hood and radiator shell must fit into general pattern and not go wandering off on irrelevant curves and tangents.

Because of resulting economy in manufacturing, radiator cores usually are rectangular in outline. This means, of course, that the shell enclosing it should be of such a character that it comfortably fits the core. Departures from this principle are usually accomplished by the use of a false radiator front, which sometimes resembles the old-fashioned false shirt-front or dickey, and has the same lamentable mechanical inefficiency and tendency to bulge.

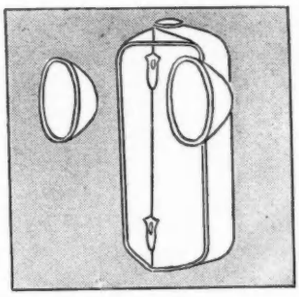
At least one abortive effort has been made to depart from the principle that radiator cores shall be rectangular in shape. One company several years ago conceived the idea that an attractive and efficient radiator could be made by causing the core to slope back from the vertical. The expense of trying to develop such a design was instrumental in placing the company in bankruptcy, according to well-informed students of automobile affairs.

On this page of this article are illustrated five representatives of the most recent car models, with particular emphasis on the essential lines of the radiator shell, and its relation to the core. These cars are the Studebaker, Cord, Chrysler, Graham and Duesenberg. The similiarity between the several cars in respect to the features cited does not require much detailed exposition. No effort is made to establish priority of design. It is simply intended to point out that the essential features of the design are the same, and that these features will probably find even broader application on the new car models yet to be announced.

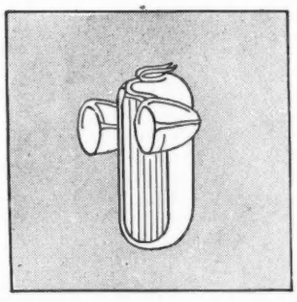
On the first page of this article are presented several types of foreign radiator design which have unquestionably influenced subsequent design in American cars. The older type of Fiat radiator shell was the inspiration for literally scores of cars, both American and foreign. It represents an older type of shell in which liberal use was made of the mathematically developed curve of parabolic



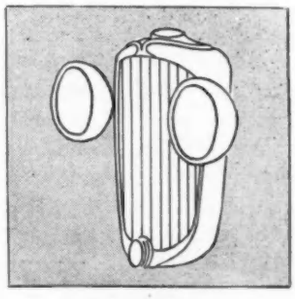
Cord



Studebaker

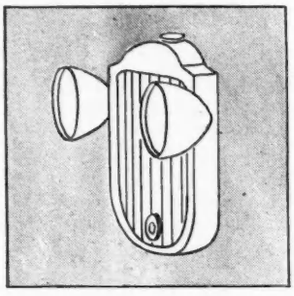


Chrysler Imperial

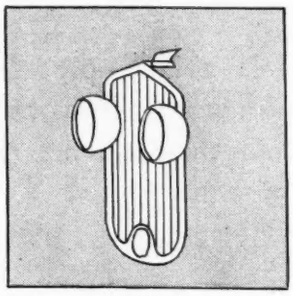


Duesenberg

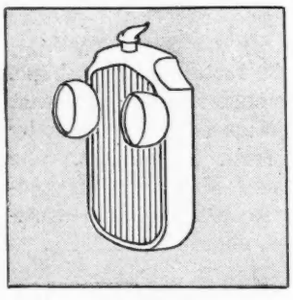
A group of modern radiator types



Packard



Chrysler



Chrysler

pattern. It will be noticed that the second type of Fiat shell bears a striking relation to the Oakland component of a few years ago, and to other American cars which followed the same general lines.

The use of the pointed radiator shell, with or without the pointed core, was early adopted by racing cars, both in the United States and Europe. So far as can be learned, the first commercial application was on the old Mercedes. The same essential feature of design is found in the modern Mercedes Benz (illustrated), and is adopted or suggested in several American cars whose birthdates have occurred during the past ten or fifteen years.

The present tendency toward a modified wedge effect in the core, and this may either be suggested or actual, is found in several of the earlier American cars: The Biddle, Premier, Owen Magnetic, Oakland (1914). The earlier cars usually had the radiator filling neck sticking up in the air like a sore thumb bulkily bandaged. In the modern types this has been hammered down to the point where it is almost flush with the top of the radiator shell.

The Mercedes has had several of its front-end superficial design features incorporated in the design of American cars. The Diana of a few years ago was a slightly modified version of numerous Minerva features. The Chrysler hood and radiator shell on last year's model of the Imperial, were similar in some respects to certain features of the Minerva, chiefly the use of the hood indentations in the form of a cornucopia.

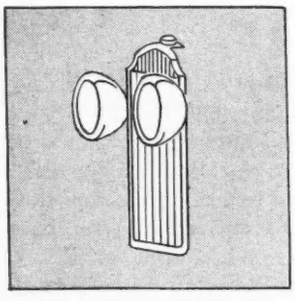
With the fundamental tendencies established, a long line of American-made automobiles have contributed one or more features to the present outlines of radiator shells. Among these cars may be mentioned the Grant, Chrysler, Chevrolet, du Pont, Chandler and many others. To Chandler goes the palm for first adopting the horizontal barred radiator shell, which has enabled some of the present manufacturers to suggest the wedge-shaped radiator core, without involving themselves in the mechanical difficulties of actually constructing the core in this shape.

The part of racing car design in contributing to the present front-end appearance of American and European car was, of course, large. There was a time not so many years ago, when almost every car buyer based his opinion of a prospective buy on the speed it was able to make, both on the road and in racing on tracks. With this psychological quirk present in the buyer's mind, the manufacturers were eager to humor it, at least to the extent of making their products look like racing cars. This, naturally, involved the use of the wedge-shaped radiator and shell, or at least the use of some design feature which would suggest it to the non-mechanically minded.

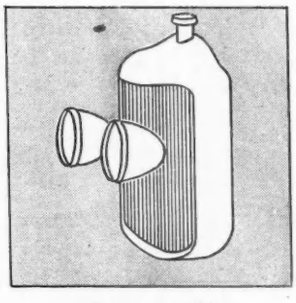
The tremendous influence on the buyer of style-trends in radiator shell and hood design is illustrated by the fact that air-cooled engine driven cars of the last few years have approached closer and closer to the appearance of those cars driven by water-cooled engines necessitating the use of a radiator. Although the characteristics of the air-cooled engine would have permitted designers much more latitude in the design of the engine covering, they have not elected to take advantage of it, but have rather striven to make their cars look like the most fashionable of the water-cooled engined cars.

This has naturally resulted in an even greater degree of similarity between all the cars now on the market

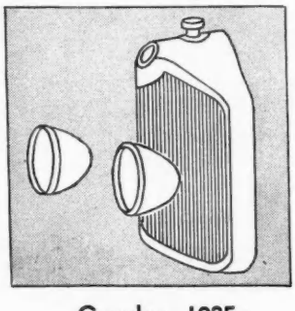
Wider use of the straight-eight engine, with its relatively long length/breadth ratio has been one of the things influencing the present almost uniform tendency. Engineering attention to the usefulness of fan-blade wash in the cooling of engine components has resulted in more engines with units in the same position, and has been fol-



Chrysler Imperial, 1929



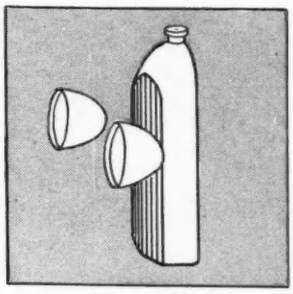
Diana, 1926



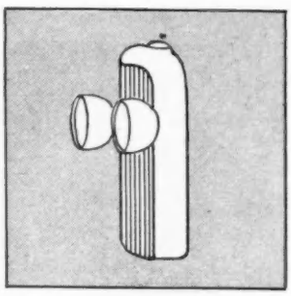
Crossley, 1925

lowed by a sort of philosophic determinism in the design of the cooling units and their enclosures.

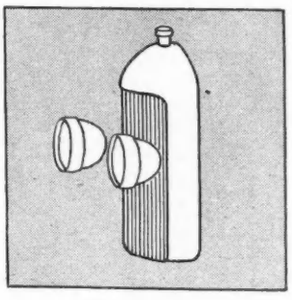
Style trends in radiator shell design, in the past, have had an average longevity of about three years, with certain fundamental features following through from one period to another. The present tendency is probably due for a longer lease on life, given the fact that the straight-eight water-cooled engine shall continue to be the shibboleth of the sales managers and designers.



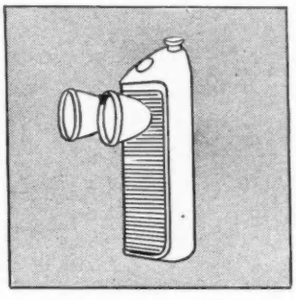
Grant



Duesenberg

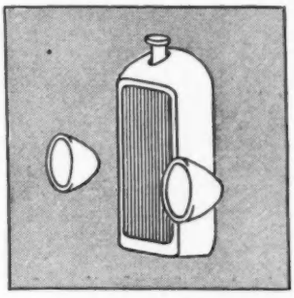


Morris



Premier

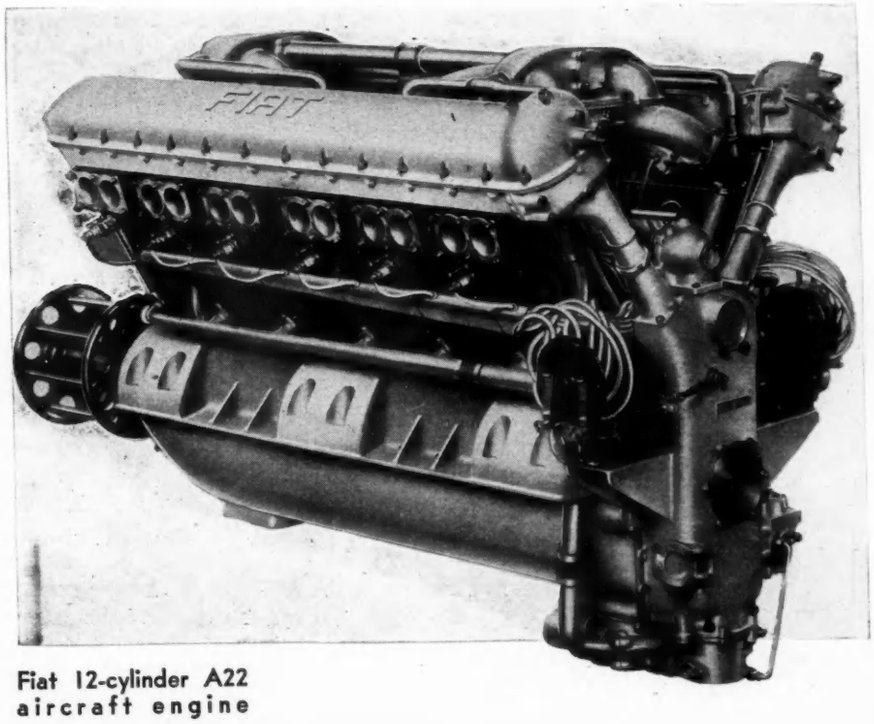
Composite types of three fundamental designs of radiator shells + + +



Armstrong-Siddeley

Many more illustrations could be added to those appearing with this article in illustration of the gradual development of and similarity between varying types of radiator core and shell design. The illustrations are offered not in an attempt to point out chronological sequence of these design features and the supposed indebtedness of one manufacturer to another resulting therefrom, but only to point out that once again a crystallized style form is in danger of obviating the inventive ingenuity of the automobile designer, even if it is only in the case of what might be considered a small detail of the completed car.

Aircraft Engine Development in Italy

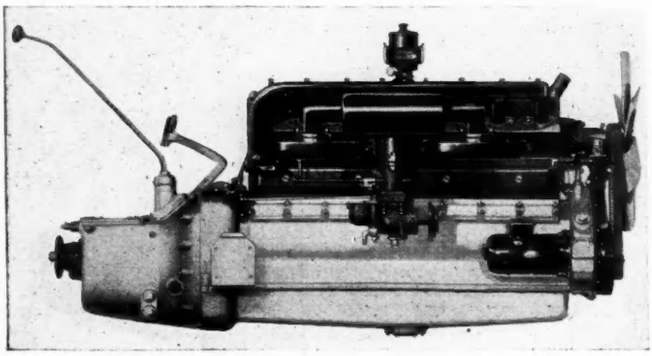


Fiat 12-cylinder A22 aircraft engine

A STOCK Fiat 12-cylinder A22 engine was used on the plane with which Major Maddalena and Lieut. Cecconi recently broke the world's endurance and distance records in a closed circuit. The A22 originally was a competition model only. Since its first appearance Elektron (a magnesium alloy) has been adopted in place of aluminum, with the result that the weight has been reduced from 1000 to 913 lb. All external oil pipes have been eliminated, the leads now being cast in the crankcase, thus avoiding the danger of fractures on long flights.

The A22 has 12 cylinders at an angle of 60 deg., with a bore and stroke of 135 by 160 mm. (5.32 by 6.30 in.). The power output at the normal engine speed of 1900 r.p.m. is 570 hp.

Major Lines Retained, With Many Minor



Right side of Packard engine, showing new manifolding

New Features Include—

Automatic chassis lubricating system

Mechanical fuel pump

Redesigned manifolding

Torsional vibration damper

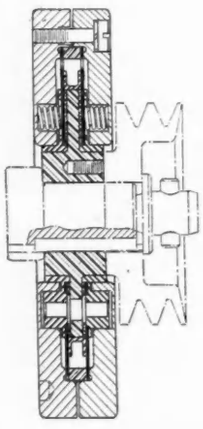
BODY lines of the 1930 Packard line, the Eight Series, remain practically identical with those of the past year and in the chassis also no radical departures are to be found in the major units. In spite of the appearance of similarity, however, quite a number of changes have been made. Body interiors have been improved, a completely automatic chassis lubricating system has been adopted, as have a mechanical fuel pump, wider and longer springs, new shock absorbers, a new type of torsional vibration damper, new manifolding, a new muffler, concealed type hood-latches, new water pump, heavier flywheels, etc. In addition numerous minor changes in design have been made to provide greater freedom from service troubles, longer life and more satisfactory operation.

Prices are lower than formerly. On the 826 and 833, the Standard Eight series model, the reduction is in the neighborhood of $100. The name Custom Eight has been dropped from the 140-in. wheelbase car, and both the 840 and 845 are now known as the De Luxe eight, with reduction in prices on the larger car ranging as high as $1,000. Incidentally, Packard is now operating its own custom body shop to supply the specialized bodies for the De Luxe series. This department is headed by R. B. Birge, formerly vice-president and general manager of Le Baron, Inc.

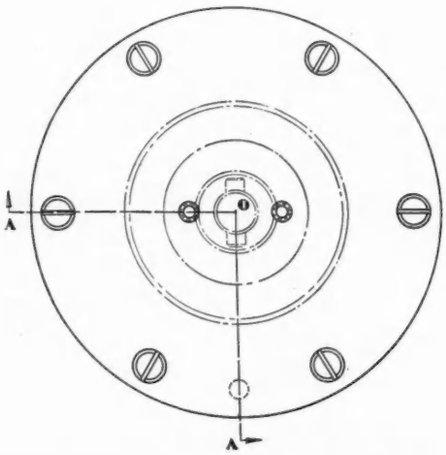
While the engines fundamentally remain unchanged, the cylinder block itself has been redesigned to improve the location and shape of the intake and exhaust passages and to provide for the new manifolding. The intake manifold itself is of the same type as on the Speedster series and has a cylindrical horizontal heater chamber at the center, fed by two passages from the exhaust ports of the two center cylinders. The new manifolding and porting arrangement is credited with the 10 per cent increase in horsepower, claimed for both engines, the Standard Eight now developing 100 hp. and the larger series 120 hp., according to the manufacturers.

Also of major importance on the engines is the new vibration damper combining the application of vulcanized rubber disks and spring controlled friction elements. This damper is practically two dampers in one, since the damping action of both friction element and rubber occur simultaneously. By means of this design an unusually large "lost work" diagram is obtainable, sufficient to cover all harmonic ranges to be expected in the operation of these engines, it is claimed.

Other engine improvements include the addition of a second ball bearing to the water pump shaft, the adoption of heavier flywheels and the adoption of a new spark plug. The valve for the piston lubricator which functions together with the choke to provide cylinder wall lubrication when starting has been redesigned.



SECTION A-O-A



Section drawing of Packard torsional vibration damper

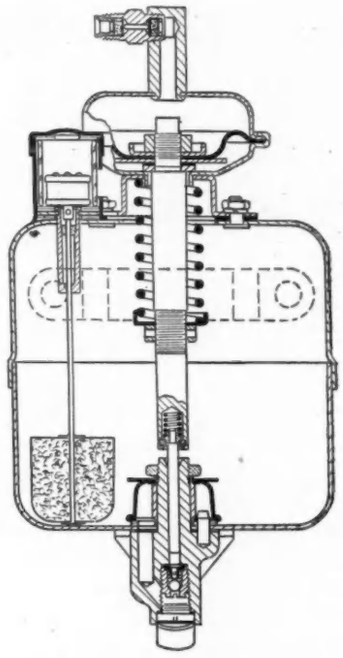
Changes in 1930 Packards

Considerable change has been made in the gasoline system in connection with the coming into use of more volatile fuels, to prevent vapor lock. The main fuel line from the tank at the rear has been placed outside of the frame side channel to protect it against the heat of the exhaust pipe and muffler. The Stewart-Warner fuel pump has also been adopted for the same reasons, driven by an eccentric cam, lever and push rod from the front end of the camshaft, the pump being mounted on the gear cover at the front of the engine.

Of major interest in the chassis, probably, is the adoption of a completely automatic chassis lubricator. This new Packard-Bijur system differs from the manual system previously used mostly in the tank unit, although the drip plugs have also been redesigned to operate at lower pressures in connection with the almost continuous feed of the system. The tank now contains the lubricating pump, which is of much smaller bore and stroke than formerly and is designed to pump about one and one-half drops of oil per stroke. The pump piston is directly connected to a diaphragm in a vacuum chamber on top of the tank and is normally held at the bottom of the stroke by a fairly stiff spring. The upper part of the vacuum chamber is connected to the intake manifold so that the vacuum tends to lift the diaphragm and piston against the spring.

With the engine idling or running steadily at any certain throttle opening the piston remains in one position since the vacuum is steady. The pump thus operates on changes in the intake vacuum rather than being dependent on the actual amount of vacuum itself. To prevent excessive pumping with rapid fluctuations in vacuum, a damper consisting mainly of a restriction is provided in the vacuum line fitting on top of the chamber.

Due to the small feed of this system, said to be about two drops per mile, it is essential that if any of the lubricating leads are serviced, that these be filled before the car is put back into operation. The lubricator serves 36 different points on the chassis, including all major parts except shock absorber links. The tank capacity is said to be sufficient for about 3000 to 3500 miles of running and is provided with a float valve to indicate the amount of lubricant contained in the tank.



Cross-section of Bijur chassis lubricator system on Packard 1930 models + + +

A narrow chromium-plated molding has been added on each side of the top hinge of the hood to act as a stop when the hood is opened. A concealed type of hood-latch has also been adopted. Front and rear fenders have a somewhat deeper outer skirt, new ribbed rubber-covered running boards also having been adopted. Chrome-plated dovetails are used to improve the operation of the doors. Front body pillars have been strengthened at the bolt through the addition of flanges and the welding of surfaces. Head room has been increased about ¾ in. by crowning the roofs somewhat more than formerly.

Packard 1930 Prices

Model	New 826	Old 726	New 840	Old 740	Old 745
5-passenger sedan	$2,385	$2,485	$3,795	$3,585	$4,985
	833	733			
7-passenger touring	2,525	2,525	3,595	3,325	4,585
4-passenger phaeton	2,425	2,425	3,490	3,190	4,585
Sport phaeton	2,725	2,725	2,790	3,490	4,885
2-4-passenger roadster	2,425	2,425	3,490	3,190	4,585
Convertible coupe	2,550	2,550	3,595	3,350	4,885
2-4-passenger coupe	2,525	2,525	3,545	3,295	4,785
5-passenger coupe	2,675	2,675	3,850	3,650	5,100
Club sedan	2,675	2,675	3,950	3,750	5,150
			845	745	
7-passenger sedan	2,785	2,785	4,150	5,185	
Sedan limousine	2,885	2,885	4,285	5,350	

Low-Cost Demand Met by Improvements

Modern equipment is designed to follow constant changes in automotive industry with its complicated operations

AUTOMOTIVE manufacturing methods are constantly changing because there is always that need to turn out a greater output at less cost. Much has been done in this direction by machinery builders through the introduction of high-production equipment that has brought about many changes in manufacturing methods, enabling the reduction of costs without sacrificing quality and accuracy—all of which has aided in bringing the automobile within the means of the average man.

Our modern milling methods, for example, have been quite instrumental in cutting production costs of automotive parts. The scope of milling is quite broad, and, as in other branches of manufacture, many changes have taken place to better machine performance. Complicated operations have been simplified—several operations have been combined into one—many other improvements have taken place—all for the purpose of meeting the demand of a low-priced product.

This article is presented to show the general trend of milling methods, by illustrating several production set-ups as used by the automotive industry, which have been developed by the Kearney & Trecker Corporation, Milwaukee, Wisconsin, to meet specific production problems. Most of the methods described can be applied to suit the milling requirements of many different parts used in automotive construction.

The milling set-up illustrated in Fig. 1 is of the index type and is performed in a No. 2 Manufacturing Milwaukee machine. The operation is the milling of a clutch face in a collar. The fixture has twelve work-holding sections arranged so that each piece is located over a stud and clamped by an individual cam-operated hinged-type clamp.

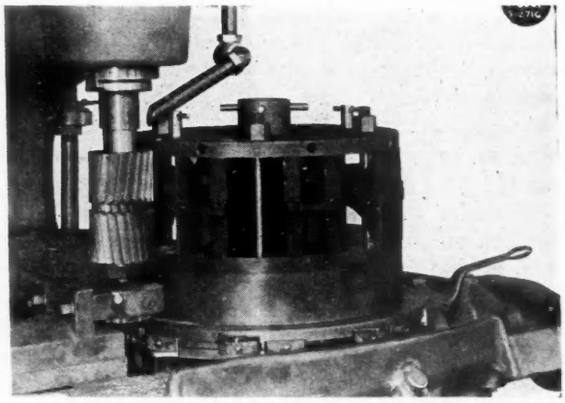
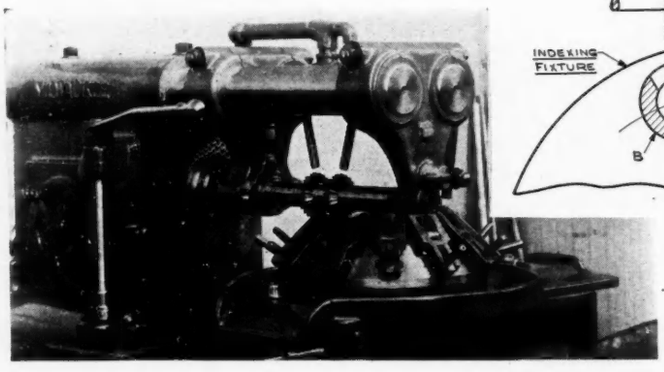


Fig. 3—Milling the outer diameter of malleable-iron truck wheels with a minimum of distortion + + + +

In Fig. 2 is illustrated the collar showing the face to be milled, and at the lower portion of the illustration is shown the arrangement of the cutters. Two cuts are required to complete the clutch face, the first of which mills a straight slot, as indicated at *A*. The index table is then rotated to the next position where a second cut is completed, thus finishing the clutch face as shown at *B*. Inasmuch as two pieces are milled at once, a collar is finished at each cycle of the fixture.

Tooling methods have been developed to meet varied conditions, and it is not uncommon nowadays to see rather extensive fixtures that have been designed to eliminate manual duties,



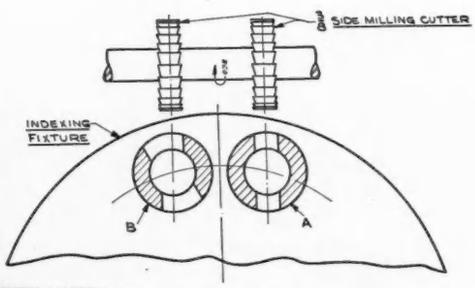


Fig. 2 (above) — Illustrating the milling operation on the machine shown in Fig. 1

Fig. 1 (left)—Milling clutch-faced collar on an index type machine + + +

in Milling Methods

By Frank W. Curtis
Research Engineer
Kearney & Trecker Corp.

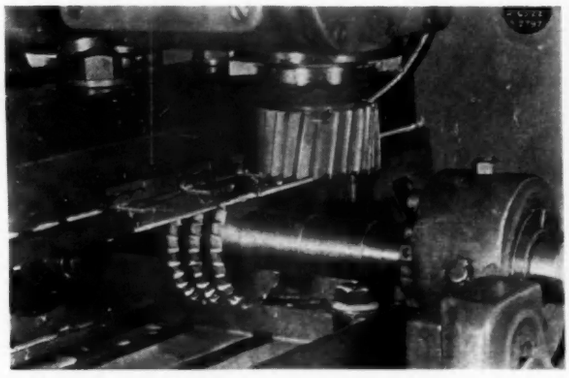


Fig. 6 — A combination machine using horizontal and vertical cutters milling a transmission shift rail + + + +

or to automatically perform some portion of the operation with which they are used. Such is the case with this fixture, inasmuch as the reciprocal sliding action and the indexing are automatically handled, so that the only duties of the operator are to load and unload the collars as the table rotates. The sliding action is obtained by a drum cam, mounted in the base of the fixture and driven by the feed shaft of the machine through bevel gearing. A roller connected to the slide operates in the cam, which in turn provides the reciprocal motion. The arrangement is such that the slide operates rapidly to the cut, then at the normal feed rate until the cut has been completed, after which it returns rapidly to the neutral position. During the return movement, the table is indexed automatically by means of a ratchet and plunger. As the table returns, the plunger is withdrawn and the ratchet is engaged by means of a trip lever, so that the table rotates 30 deg. Then as the table proceeds toward the cut, the plunger automatically engages into the next location. This fixture is operated at a feed that enables six pieces per minute to be completed, or a total of 360 per hour.

A rather unique method of milling the outer diameter of malleable-iron truck wheels is illustrated in Fig. 3. The wheel has eight spokes and is finished to a diameter of 18½ in. The rotary table is of the skip-stop type, having two feed rates, one being the normal feed rate for the cut, and the other the rapid feed rate to eliminate lost time between cuts. The cutting feed rate is 17 in. per minute and the rapid movement is 275 in. per minute. This combination enables a production of from 22 to 24 complete wheels per hour. The width of the cut is 6 in. and the amount of metal removed is approximately ⅛ in. One of the advantages of milling work of this kind is the small amount of distortion that results.

The operation shown in Fig. 4 is that of straddle milling and facing the top of transmission shifter forks, in a No. 2 horizontal machine equipped with two auxiliary vertical spindles. Two pieces are machined at one time by means of an indexing fixture arranged so that one station of the fixture can be load-

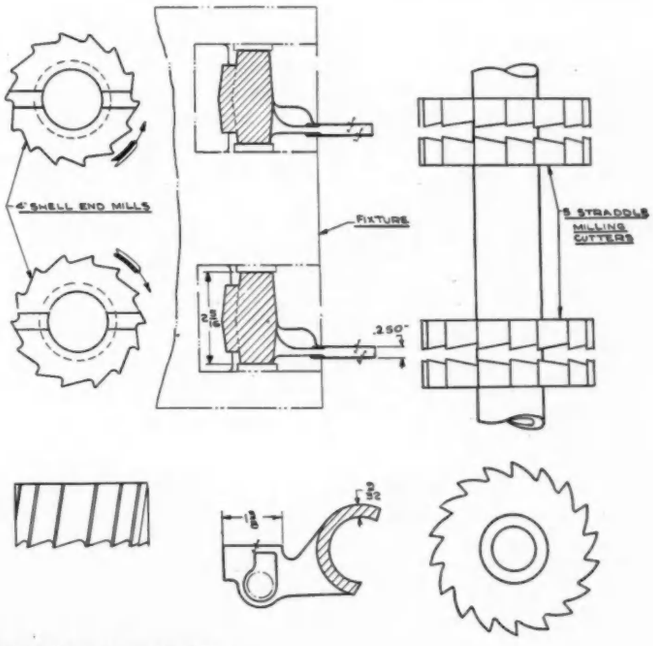


Fig. 5 — Diagrammatic layout of the relation of cutters and work shown in Fig. 4 + + + +

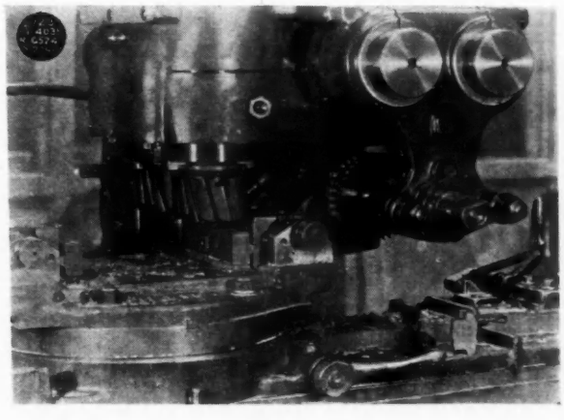


Fig. 4 (left)—Straddle milling and facing the top of transmission shifter forks + + + + +

ed while the opposite station is in use. The operation is completed by engaging the feed in both directions after the indexing has been completed. The feed motions, however, are entirely automatic and operate as follows: First, the fixture moves toward the straddle milling cutters so that both sides of the forked section are milled. Then, after this cut has been completed, the table moves rapidly in the opposite direction so that the end mills can face the top surface.

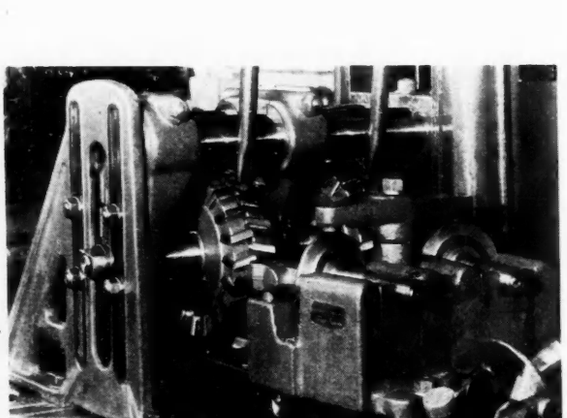


Fig. 7—Inside facing two tractor steering spindles at one time, with two pairs of interlocking cutters of the inserted-blade type + + + + + +

When the table reaches a predetermined position the rapid feed rate is released and the normal feed rate is engaged. Likewise, when the top surface has been machined the table travels rapidly to the neutral position, after which it is indexed.

In Fig. 5 is illustrated a diagrammatic layout showing the relation of the cutters and the two pieces to be milled. The end mills are 4½ in. in diameter and the half-side milling cutters are 5 in. in diameter. The production obtained with this set-up is 240 pieces per hour.

Another operation using combination horizontal and vertical cutters is illustrated in Fig. 6, which represents the milling of transmission shift rail in a No. 2 horizontal Milwaukee machine, equipped with two vertical spindles. The workpieces are held in a bridge-type fixture arranged with clamps that hold four pieces at once. The fixture accommodates a total of eight pieces. The operation includes the milling of both ends, as well as three detents at the center of the rail.

As soon as the operator has loaded four pieces in the fixture, the feed is engaged, then the remaining four pieces are loaded during cutting. The milling of the surfaces performed in this operation formerly required two individual set-ups. Therefore, the advantages of modern tooling are clearly indicated.

The operation shown in Fig. 7 is the inside facing of steering spindles used in the construction of a tractor. The fixture is arranged to hold two pieces, both of which are machined at one time by two pairs of interlocking cutters of the inserted-blade type. The machine is a Mil-Waukee-Mil arranged with a drum-cam feed that enables the work to approach the cutters rapidly, then feed at the normal cutting feed, and finally to rapid traverse to the loading position. The workpieces are located by hardened pins from their projecting members and by V-blocks from their bearing diameters. Clamping of both pieces is done by a single clamp of the pivoted type which can be swung out of the way to facilitate loading. Approximately ⅛ in. of metal is removed from each side, a complete cycle requiring one minute, thus giving a production of 120 pieces per hour.

Cylinder blocks are often designed with small pads or faces so located that they cannot advantageously be handled in groups. For this reason, it is necessary at times to perform these operations singly on knee-type machines. Such an operation is illustrated in Fig. 8 which represents the milling of an angular face of a six-cylinder block, on to which the distributor head is mounted. The machine is a No. 2 vertical Milwaukee miller, arranged so that the table has a special cross-feed arrangement. As in the previous examples, the cycle includes rapid traverse to the cut, then a normal feed rate until the pad has been completely milled, and finally rapid traverse to the loading position. The cylinder block is mounted angularly on a fixture that is provided with a combination clamping and locating feature. When the handle at the right is actuated, two disappearing locating pins are elevated to enter two reamed locating holes in the cylinder block. During the same motion, two hinged-type clamps are engaged by means of cams located on the cross-shaft to which the handle is attached. Thus, locating and clamping are obtained by a single lever motion. The cutter is of the inserted-blade type, 6 in. in diameter, and the feed is so arranged that a production of 90

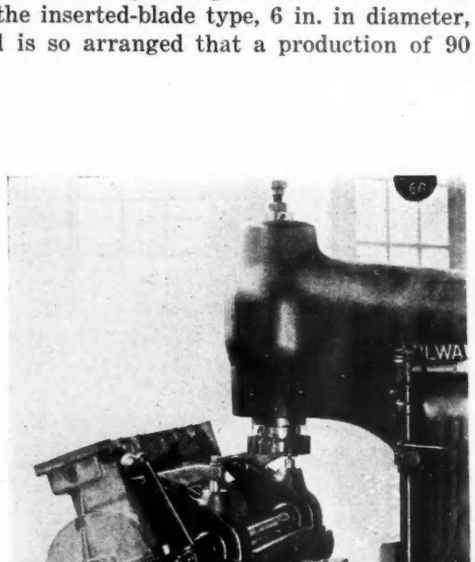


Fig. 8—Milling the angular face of a six-cylinder engine block + +

pieces per hour is attained.

Multiple-spindle machines are being used more extensively for the manufacture of various parts, first because the production time can be reduced considerably by machining several faces at one time, and secondly, because of the assurance of correct alignment when so handled. A rather unusual set-up for the milling of various surfaces of the cylinder block in a Mil-Waukee-Mil of the Duplex type, equipped with eight spindles. A close-up view of the machine and fixture is shown in Fig. 9. The upright at the left-hand side of the machine is equipped with four spindles, the opposite upright has a single spindle, while the auxiliary vertical head mounted between these upright is provided with three spindles, one of which is set at an angular plane.

The layout in Fig. 10 shows the general arrangement of the cutters in relation to the cylinder block. The large cutter at the right faces the top of the cylinder rolls and two end mills, and two smaller inserted-blade cutters at the left face the bottom surface and the fit for the bearing caps. The cutters mounted in the vertical unit machine the face for the valve cover, the angular pad for the distributor head, and a small pad to which the starting member is attached. All of the spindles can be adjusted independently in order to compensate for cutters of various lengths and diameters. Prior to this method of handling, four separate operations were required to complete the surfaces now finished at once, whereas the present method has reduced the cost approximately 50 per cent.

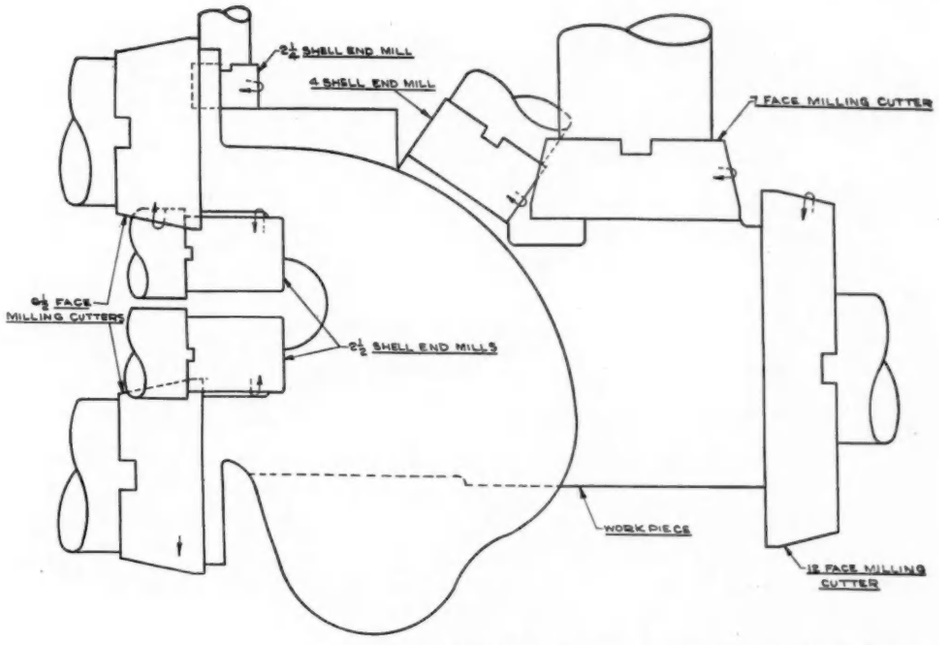


Fig. 10—The general arrangement of the cutters on the machine shown in Fig. 9 is illustrated above

Prior to this method of handling the cylinder block milling, four separate operations were required to complete the surfaces finished now in one setting

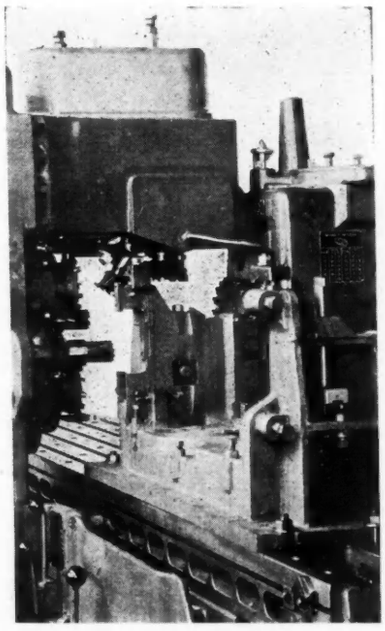


Fig. 9—An unusual set-up for milling various surfaces of a cylinder block in one operation + + + +

When interchangeable manufacturing methods were first introduced in the early 80's, no real thought was given to quantity output since the original purpose was to make parts alike. Production costs were naturally reduced, but the savings were largely the result of less fitting at assembly. When automobile manufacture had progressed to a competitive basis, there was a need for better machinery that would produce a greater output and yet maintain the desired accuracy. Hence, it is to the automotive industry and machine tool builder that credit is given for linking together high-production methods with interchangeability, and incorporating the two economic requirements so necessary in making duplicate parts in quantity lots at low costs.

INTERNATIONAL trials of tractors and other agricultural machinery are to take place at the Agricultural School at Kragujevac, Jugoslavia, commencing on Oct. 20. Application to participate in the trials may be up to Sept. 15.

MacKenzie Compound Hydraulic Brake Has Automatic Pressure Control

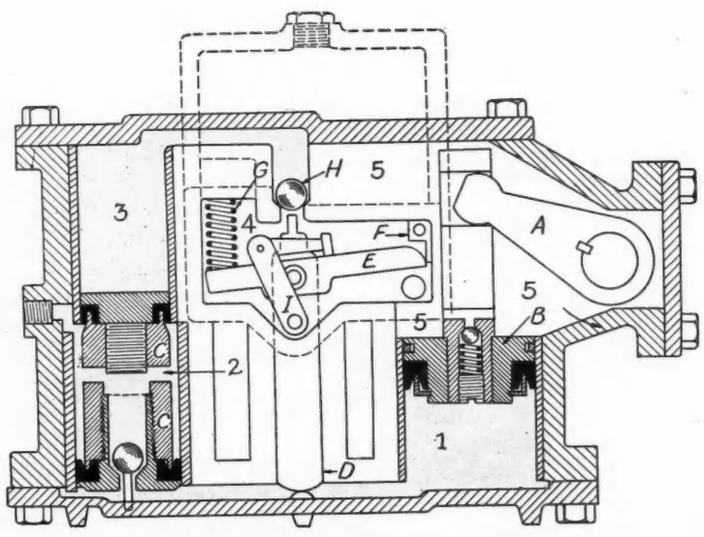
Master operator assembly, corresponding to cylinder in conventional unit, operates a secondary pressure installation on the wheels, increasing the mechanical advantage + + + + + + + +

A BRAKE for motor vehicles which assures that on application, the clearance between brake shoe and drum is taken up rapidly and in which the mechanical advantage is then automatically increased, has been developed by the Duplex Brake Engineering Co., Inc., Trenton, N. J.

Briefly, the action of the "master-operator assembly," which corresponds to the master cylinder in the ordinary hydraulic brake, is as follows: The brake pedal acts through suitable linkage on a plunger in a cylinder of considerable diameter. Thus any slight movement of the pedal displaces fluid rapidly, and this fluid passes directly to the wheel cylinders or brake cylinders, with the result that the pistons in these brake cylinders are moved apart and the clearance between brake shoes and brake drum is taken up rapidly.

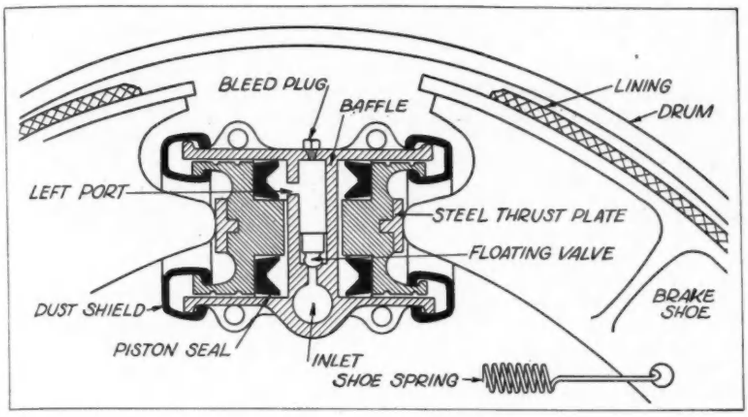
As soon as the clearance is taken up, the pressure in the system increases rapidly, and the increased pressure shuts off direct communication between the primary pressure cylinder and the brake cylinders. The fluid from the primary cylinder then acts against a plunger in a secondary cylinder. This latter plunger is of the stepped type, having an upward extension of reduced diameter which is a snug fit in a tertiary cylinder. When the fluid from the primary cylinder presses against the lower, large-diameter end of the plunger, the latter moves upward and forces fluid from an annular space between the wall of the secondary cylinder and the upward extension of the plunger therein. Since the cross-sectional area of this annular space is much smaller than the cross-sectional area of the secondary cylinder, for a given displacement of the plunger, much more fluid must flow into the secondary cylinder than flows out of the annular chamber, and in the same proportion as the rate of flow of the fluid is reduced, its pressure is increased.

Now, referring to the sectional drawing of the master-operator assembly (which is somewhat diagrammatic in nature), the lever arm *A* inside the housing is secured to a shaft having a bearing in the wall of the housing and carrying another arm on the outside, from which link connection is made to the brake pedal. Arm *A* in chamber 5 acts directly on plunger *B* in the primary cylinder 1, and when the plunger is forced down by pressing on the brake pedal, fluid passes from cylinder 1 through the passage extending across the bottom of the housing, into the hollow plunger *C*, past a ball valve therein (which is held off its seat by means of a stop pin), out through ports in the wall of plunger *C*, into the annular space surrounding the plunger, and through the outlet from this space through the usual distributing tubing to the brake cylinders.



Schematic diagram of master-operator assembly of MacKenzie hydraulic brake

After the clearance between shoes and drum has been taken up, if pressure on the brake pedal is continued, the pressure on the fluid in the system increases rapidly. When a pressure of about 60 lb. p. sq. in. has been reach-



Wheel-cylinder assembly of MacKenzie brake

ed the control plunger *D* is raised, which in turn raises the lever *E*, pressing it against a fixed stop *F* at its right end and compressing a coiled spring *G* bearing against its left end. These various parts are located in chamber 4. Control plunger *E* carries a pin at its top, and when the plunger is raised this pin lifts the ball check *H* from its seat. As long as ball *H* remained on its seat it entrapped fluid in cylinder 3, which prevented plunger *C* from rising under the pressure exerted by the fluid against its bottom. Now that the fluid can escape from 3, plunger *C* will rise, with the immediate effect that the passage through it will be closed by the valve seat moving up to the ball. Any further pressure now will cause plunger *C* to continue its upward movement and will force fluid from the annular space surrounding plunger *C*, into the lines, the pressure on this fluid being greater than the pressure on the fluid acting on plunger *C* in the proportion of the total cross-section of plunger *C* to the difference between this cross-section and the cross-section of the extension of the plunger.

Fluid passing the ball check valve *H* enters chamber 4, from which it passes to chamber 5 through a drain port near the bottom of chamber 4. From chamber 5 the fluid returns to cylinder 1 through a ball check valve in plunger *B* when the latter returns to its normal position upon release of the brakes.

The pressure of brake application can be controlled by means of the control mechanism in chamber 4, comprising an arm *I* mounted on a shaft extending through the wall of the chamber. Inside the chamber the arm carries a movable stop for the lever *E*, while outside the chamber the shaft has an arm from which a wire control connection is made to the dash of the car. By means of this control device the brake can be so set that at a given point the resistance to pedal travel increases very rapidly. The control does not put an absolute limit on the force of brake application, but by making it more difficult to reach excessive forces, tends to prevent unintentional locking of the brakes. This control is not a regular feature of the brake for passenger cars, but is optional.

A feature of the brake cylinders is a floating check valve. This is located in a small central wall between the heads of the two halves of the cylinder. When the pedal is depressed for brake application the influx of fluid to the brake cylinder raises the valve in its well, and the fluid passes through a small port in the cylinder head into the cylinder, setting the brake. Upon release of the pedal the small valve returns to its seat and its return motion automatically fixes the clearance for the brake.

A reserve tank is formed integral with the master-operator assembly. Adjustment for wear of the linings is automatic.

Wright Cyclone Models for 1930

THE Wright Aeronautical Corp., Paterson, N. J., has placed in production two new engines for commercial and military planes, the Cyclone Models R-1750-E and R-1820-E. These are nine-cylinder radial air-cooled engines, the 575 hp. Model R-1820-E being the most powerful engine of the Cyclone series and said to be capable of developing over 600 hp. at its normal speed of 1900 r.p.m. The other new model, the R-1750-E, is a direct development of the 1929 Cyclone with refinements to improve its output.

A comparison of the R-1820-E with the Wright Whirlwind engine which powered the plane with which Col. Lindbergh flew to Paris in 1927 reflects great forward strides in engine design during the three years that have passed since that memorable event. The new Cyclone develops nearly three times as much power, yet weighs only 60 per cent more than Lindbergh's engine, the specific weights of the two engines being 2.60 and 1.35 lb. p. hp.-hr. respectively.

The average maximum cylinder head temperature of the Lindbergh engine was approximately 575 deg. Fahr., while the cylinder head temperature on the R-1820-E is only 375 deg. This reduction in temperature has been achieved in spite of the fact that the new engine has only about 65 per cent as much cooling area per cubic foot of cylinder displacement as the Lindbergh engine, any increase in cylinder volume being accompanied by a smaller proportionate increase in cooling area.

The temperature reduction has been accomplished by refinements in the design of the cylinder head, the use of spark-plug coolers, and by air deflectors which properly direct the air around the cylinder head and barrel.

A centrifugal-band-type clutch is incorporated in the supercharger drive, to relieve the gears and shafts of the loads caused by sudden acceleration or deceleration of the engine.

Aviation Industry Shows Open Mind on Giving Heed to Developments Regarded

TO judge by the discussions at the eighteenth annual aeronautic meeting of the S.A.E., held at Chicago, Aug. 26-28, and particularly by the views expressed by such prominent men in the industry as Henry M. Crane and William B. Stout, the chief problem faced by the industry is not one of detail improvements, lowered manufacturing costs, popular education and improved merchandizing methods, but is of a more fundamental nature.

There is not a doubt that this year's sharp decline in airplane sales has had the effect of making the industry take stock of itself, and the question naturally has arisen—Is the decline only temporary and will the future of the industry be marked by continued gradual improvement and growth, or are radical changes in the type of product necessary before it will be accepted by the public?

Of course, only time can answer the question, but the intense interest which aircraft manufacturers have been exhibiting at Chicago in what would have been considered freak designs only a year ago is significant. The Autogiro, the "doodle-bug," the variable-incidence-wing type of plane, the circular wing, all came in for their share of attention. Engineers and manufacturers, while not regarding any of these devices or designs as the final solution of aviation's difficulties, appreciated the public's interest in them, and are regarding them, and the ideas which might possibly develop from them, with a far more open mind than would have been possible even a year ago.

This attitude was reflected through several sessions of the technical meeting of the S.A.E., both in the papers presented, and—what is more important—in the discussions which followed the meetings.

It would be difficult to imagine two more distinctly opposed methods of attack or discussion of a problem than those represented by the two papers read at the airplane-design session. The subject under discussion was improvement in aerodynamic characteristics of airplanes. One of the papers, entitled "Flight Research," was by William J. Crowley, Jr., of the National Advisory Committee for Aeronautics, while the other, on the "Possibilities of Radical Airplane Design," was by William B. Stout, president, Stout Air Service.

Mr. Crowley's paper dealt, on the one hand, with research on airplanes in actual flight, to determine their maneuverability and thus to work out the principles underlying airplane performance. Mr. Stout, on the other hand, believed that little could be done with present airplane designs and that some radical thought on flying vehicles was necessary. Said Mr. Stout: "No one has yet built an airplane; we are fiddling around with kites; and we are now more or less forced, whether we like it or not, to take up the subject of radical airplane design and get busy on the problem."

Mr. Stout expressed the opinion—and in this he agreed with Henry M. Crane, who had spoken on the subject at an earlier session—that except for the advances in the design of aircraft engines, the last three years especially had been almost unproductive of any major improvement in aircraft. To emphasize this, Mr. Stout pointed to the tremendous advances made in the motion picture, radio and automobile industries.

Aerodynamic improvements, Mr. Stout felt, were limited too much by structural considerations, although he thought that the adoption of structural and stainless steels, the former for strength, and the latter for corrosion-resistance especially, would be of some assistance. Another development which Mr. Stout considered essential was the working out of a method for the automatic inspection of welds to insure homogeneity of welded joints.

As to the lines of thought which might be followed in airplane design, Mr. Stout said his guess was only as good as that of another. He mentioned the "tail-first" type of airplane, the flying-wing type of plane, with engines completely housed and propellers driven by shafts, and the Waterman plane with its variable incidence wings ("flapping wings" he called them) as subjects worthy of study.

The most important consideration, Mr. Stout felt, was an increase in operating speed without sacrifice in other directions.

Fundamental Changes in Design as Freaks Last Year

Technical sessions of the S.A.E. Aeronautical Meeting at Chicago give evidence of a more liberal attitude toward unique and unusual plans included in Autogiro, "doodle-bug," circular wing and variable-incidence-wing type of planes + + + +

Charges made that, except for engines, the last three years have been unproductive of major improvements in aircraft + + +

By Athel F. Denham

As an example of what can be done in this direction, even with existing designs, he called attention to the recent streamlining and refinements in other respects of the Ford Transport, which resulted in raising its cruising speed at the same engine r.p.m. by some 20 m.p.h. He estimated that the net saving resulting from these improvements in the operation of the Chicago-Detroit line would be around $600 per day, taking account of engine and plane depreciation, fuel costs, pilot's time, etc.

In one respect (he commented) the airplane problem was similar to that of the automobile—with respect to silence of operation. The public does not mind noise on the railroads, but it wants silence in automobiles, and it most certainly wants it in airplanes.

Mr. Crowley's paper dealt largely with the instrumentation developed for determining the flight path of an airplane during a maneuver. These instruments consist mainly of an accelerometer, a turnmeter, and an air-speed meter, developed by the N.A.C.A., in which, by means of an optical recording system, the errors due to acceleration forces have been largely eliminated. This optical recording system consists essentially of a light source, a lens, a film drum (electric-motor-driven), and a rotating mirror. An integraph is used for plotting the flight path curves from the records obtained from these instruments. To date, experimentation has been largely confined to pulling out of dives, an important consideration for bombers. The results obtained so far, according to Mr. Crowley, show that the usual formula for the acceleration in a dive, equal to the square of the velocity divided by the radius of the flight path (in a 90-deg. pullout equal to the altitude lost), is entirely inadequate, since the acceleration is never constant but drops off after reaching a peak value at the start of the pullout. Some preliminary work has been done also on "spins," although the experiments have been confined to one type of airplane. In this particular type it was impossible to produce a dangerous spin.

At the request of B. Russell Shaw, chairman of the session, Paul Nemeth, of the Nemeth Airplane Co., Chicago, briefly discussed some of the work his company has been doing on a circular-wing airplane. According to Mr. Nemeth, the major advantages of this type of design are traceable to the material decrease in span possible, but the type is still in the developmental stage.

Weight Saving by Structural Efficiency

THE endless compromises between considerations of aerodynamical and structural efficiency which design engineers are forced to make probably have been rarely so well illustrated as at the Wednesday morning Airplane-Design session. As A. A. Gassner, chief engineer, Fokker Aircraft Corp., pointed out in his paper, the airplane designer, to start with, has direct control over only 45 per cent of the weight of the finished product. Engines, propellers, starters, etc., are entirely out of his hands. Over fuel and oil tanks, floors, bulkheads, chairs, windows, etc., he has only limited control. A 10 per cent reduction in the 45 per cent residues therefore represents only a 4½ per cent saving in total airplane weight, although the resulting increase in payload is around 13½ per cent.

Both Mr. Gassner and Charles Ward Hall, president and chief engineer, Hall Aluminum Aircraft Corp., who were assigned to discuss weight saving by structural efficiency with respect to composite and all-metal construction, respectively, made the point that the most efficient plane from the structural point of view is not ideal from the aerodynamic standpoint, and cited numerous design details to carry their points.

Minor suggestions as to the possible improvement of structural designs on a weight basis were included in both papers. But at least a part of the audience questioned whether this constant research and solving of minor difficulties was the final answer to the problem of efficient air transport. Mr. Hall, especially, offered numerous slides of interesting design details. A single-seater fighter, for instance, had the lift wires of the upper wing attached to a common point on the fuselage, which was said to almost completely eliminate the need for internal drag bracing for usual flight conditions. It was shown that material can be removed from the wing spar of a braced biplane and a wing member produced that is actually stronger in flight than the original design, due to the straightening of the spar in flight. New shapes of fittings and of members carrying both compression and bending stresses were illustrated as steps taken toward the evolution of airplanes more efficient structurally.

But on the whole the impression remained that the efficiency of any airplane is dependent on the ability and ingenuity of its particular designer and that no fundamentals were as yet available which would permit of a general weight reduction in all types by an increase in structural efficiency. Largely responsible for this, as Mr. Gassner pointed out, is the fact that the important structural elements in an airplane are of an indeterminate nature, in connection with which formulae, geometry, rules of thumb and empirical data are of little use.

Airplane Engine Costs—Reduction and Reasons

A PROGRAM for cost reduction, and a justification for the high costs of airplane engines formed the basis of the two papers presented at the Engine Session. The first paper, by E. D. Herrick, chief engineer, Lycoming Mfg. Co., was entitled "Manufacturing Costs of Aircraft Engines," while the second, by H. M. Crane, General Motors Corp., carried the title "Comparative Data on Powerplants for Motor Cars and Aircraft." At the request of the chairman, J. H. Geisse, vice-president, Comet Engine Corp., Mr. Crane gave his views on Diesel engines, in addition to a more general discussion of aircraft powerplants.

Mr. Crane pointed out that the Diesel originally was intended to supply in the internal-combustion field, operation analogous to that of a steam engine, i.e., expansion at constant pressure. However, it was impossible to prevent high explosion pressures at the higher crankshaft speeds demanded of the aircraft engine. Mr. Geisse differed with this view, however, claiming that it is possible to run Diesels at high speeds without high combustion pressures by developing a fuel that can be burned at constant pressure. Such a fuel for use in Otto-cycle, spark-ignition engines, he said, had been developed already by General Motors.

Wesley Smith, National Air Transport, while stating that he did not wish to enter into a controversy on the pros and cons of Diesels and spark-ignition engines, gave the impression that he was more favorably inclined toward the Diesel. This impression, at least, might be formed from his criticism of carburetion and ignition systems for Otto-cycle engines. His chief criticism of present carburetion systems was that they were not sufficiently independent of gravity, acceleration and moisture-content of the atmosphere. The only way out, he said, was a radical change in the conception of the fuel supply system, which must meet all weather conditions. With respect to spark ignition, Mr. Smith claimed that the large capacities introduced by the adoption of radio as standard equipment for transport operation were not sufficiently appreciated. Fuel injection, he felt, might make possible the elimination of a separate starter.

A further point brought out in the discussion was that whereas the carbon monoxide content of the exhaust gases ranges around 2 per cent in the spark-ignition engine, it is less than ½ per cent in a Diesel engine. The obvious reply, of course, was that the Diesel works with a large excess of air which insures good combustion but also results in a low m.e.p. and low power. Mr. Crane, however, claimed that similar combustion efficiencies and, therefore, a similarly low carbon monoxide content in the exhaust, could be obtained with Otto-cycle engines, pointing out that such engines had been run at the Bureau of Standards with a fuel consumption of 0.38—0.40 lb. per hp. per hr.

In his discussion of manufacturing costs, Mr. Herrick emphasized the need for cooperation on the part of parts suppliers, to the end that an economical-production-design might be obtained and that the fundamental requirements which must be met should be clearly defined. Inspection of parts, for instance, should be at the source, and he expressed a hope that suppliers would be able to fully assume the responsibility for this in the future. The need for continuous inspection of parts during fabrication, to make possible rejection for defects with minimum machine work on the part, was also pointed out. Other angles of cost attack cited included the use of standard machine tools with special fixtures, rather than the use of special-purpose tools subject to frequent alterations with changes in design. Mr. Herrick also believed that the use of machine tools of abnormal strength facilitated producing the desired finish. Elimination of unnecessarily close tol-

erances and the purchase of parts in large quantities were further aids to cost reduction listed.

One of the clearest explanations of the reasons for the difference in costs of automobile and aviation engines was given by Mr. Crane. He started out by pointing to the close similarity in outline dimensions between the Cadillac eight and the Hispano 300 engine, which he said was accidental. The engines also are of nearly the same weights, but whereas an output of around 420 hp. had been obtained with the Hisso, the maximum horsepower of the Cadillac engine was around 105. The crankpins of the Hisso are actually smaller in diameter than those of the Cadillac and only exceptionally high grade materials could make possible the use of such light crankshafts. To quote Mr. Crane, "the actual delivered cost per pound of many an automobile is less than that of many materials used in aero engines."

In an automobile, Mr. Crane claimed, weight is a desirable rather than an undesirable factor. Given two cars, one weighing 3500 and one 4000 lb., selling at the same price, and with comparable performance, the heavier car would be preferred in spite of its higher fuel and tire cost. To quote Mr. Crane: "Rigidity is a prime factor, and this can be obtained only through the use of more material, heavy sections, addition of ribbing, etc., unless materials with a higher modulus of elasticity are obtainable."

If the cost-reduction-by-weight-increase method is followed in the aircraft field, Mr. Crane said, not only does the efficiency of the airplane go down, but cost goes up due to the additional wing surface required for carrying the additional weight.

As to the differences between military and commercial engines, Mr. Crane expressed some doubt. He stated that when General Motors went back into aviation recently, it had the idea that a military engine was fine for military purposes only. He doubted whether this was a fact. To the development in aircraft engines, Mr. Crane attributed most of the progress aviation has made, minimizing the advance accomplished in aerodynamics.

Mr. Crane concluded the first part of his address with a prophecy that heat distortion of aircraft-engine cylinders would lead to a further increase in cylinder number, which would be reflected by a further increase in costs, and with the suggestion that there might be something worthwhile in Mr. Kettering's idea of obtaining smoothness in multi-motor installations by electric coupling or synchronization of the powerplants.

In his discussion of Diesel engines, Mr. Crane certainly left the impression that he was not a strong believer in their immediate future in the aircraft field. Among their disadvantages he cited their inability to produce power smoothly when lightly built, the possibility that refining costs for Diesel fuel might eventually be greater than for gasoline, that the specific output of the Diesel is limited by the time required to distribute the fuel throughout the air charge in the combustion chamber, while that of the Otto-cycle engine increases with the speed, and that the fuel-injection pump will cause more service troubles than the electrical system of a gasoline engine. He admitted that the Diesel was ideally suited to lighter-than-air craft, but held no fully successful installation of such an engine in an airship had yet been made.

Fuel Specifications — Problem of Refiners

THE Fuels Session was in the nature of a symposium on the general subject. Engine manufacturers were represented by W. A. Parkins, of Pratt & Whitney, who had prepared a paper that was read by Mr. Rider of the same company; operators had E. W. McVitty of Pan-American Airways, Inc., for their spokesman, and the views of refiners were expressed by E. E. Aldrin, of the Standard Oil Company of New Jersey; C. M. Larson, of Sinclair Refining Company, and Major J. H. Doolittle, of Shell Petroleum Company. S. D. Heron discussed the problems of the Powerplants Division of the Air Corps.

One difficulty under which that section of the petroleum industry which is catering to aircraft services is laboring is due to a multiplicity of fuel specifications. Each additional specification issued necessarily decreases the market for any particular kind of fuel.

According to Mr. Larson, the total amount of gasoline consumed in 1929 by private and commercial aircraft was about 22,000,000 gal., as compared with 15,000,000,000 gal. consumed by automobiles. Mr. Larson listed five different grades of gasoline required by different groups, and if we consider the ever-growing list of those to whom no existing fuel specifications are satisfactory, the seriousness of the problem confronting the refiner may be appreciated.

Take the matter of volatility. To prevent vapor lock it is necessary that the low ends do not come off too readily. Starting requirements, however, call for the presence of at least a small percentage of highly volatile elements. The balance between the two conditions is hard to strike, and even if a fuel should be offered that met both conditions theoretically, it would probably meet neither for the industry as a whole; variations in operating conditions, atmospheric temperature, engine design, fuel systems, etc., would make it appear to lean in one direction or the other.

Major Doolittle, moreover, was of the opinion that the initial point on the distillation curve largely determines the fire hazard, although in the discussion exceptions were taken to this statement. Again, for a quick warming up, any given powerplant requires a fuel of which a definite percentage of the total passes over below a given temperature, this being set at between 60 and 70 per cent by the Major. This figure also will vary from engine to

(Continued on page 346)

JUST AMONG OURSELVES

The Companion Car Idea Passes Into History

EVERY year the number of "companion car" lines has diminished. The trend follows predictions made on this page several years back. The companion car idea involves certain fundamental psychological and merchandising difficulties hard, if not possible, to overcome. This year has seen the passing of two companion car names already. Will more pass before the year is out? We think so.

Pipe Smoker Contributes More Than Measured Time

HEARD it rumored the other day that one of the biggest sales executives in the industry is strongly opposed to pipe smokers. Says that a pipe smoker is worth 10 per cent less salary than another man of equal ability, so the story goes, because he spends that much of the company's time filling his briar and keeping it alight.

Methinks one a bit naive who would believe that discontinuance of pipe smoking would result in the time previously taken for same being metamorphosized into direct productive effort. Nail biting and cleaning, borrowing cigarettes, lending cigars and discussing golf are more likely substitutes—habits all of them certainly contributing no more to the cause of business efficiency than the idea-stimulation and inspiration which a bad-smelling pipe brings to its devotee. As a smoker of anything that burns, we rise in defense of the pipe as the most soul-satisfying smoke of all.

In the editorial department of our organization at least, most of the best articles and editorials have been first envisaged in a cloud of pipe smoke . . . and death to the wag who now remarks that is why so many of our editorials are just a lot of hot air!

Merchandising Service May Bring New Car Sales

"IN the past the car owner usually has gone for service to the place where he bought his automobile. In the future, it is quite conceivable that he will buy his car where he has already been going for service."

This statement, made by a man long familiar with automotive merchandising, is worth thinking about. Interpreted in its broader aspects it implies more than that a car dealer who gives good service to an owner will sell him another car. It implies even that the man who has established himself as a frequent stopping place for minor and major services may be an important and sought-after car sales outlet.

We're not prepared to support this conception fully in any sense, but recommend it for your contemplation.

Long Range Prophecies of the Ancient Seers

SOME people were air-minded in 1879. Looking through some old 1879 bound numbers of *Scribner's Magazine* the other day, Herb Hosking, our bustling news editor, found an article on "Aerial Navigation" by Edmund Clarence Stedman, in which the author predicted at long range several things which have since come to pass.

Daring indeed was the man who in 1879 prophesied that the "aeronon" of the future would be a cigar-shaped container filled with nearly chemically pure hydrogen, propelled by screws extending from the main structure; that the structure itself would be of hollow tubing, probably aluminum, and that it was likely that aluminum sheathing for the gas bag would come into general use.

At the time Mr. Stedman wrote, the screw propeller, even for marine vessels, was a very new thing; experiments in the navigation of spherical balloons had tended to disprove the possibility of directed aerial navigation, and the element aluminum had only recently been isolated in the laboratory and cost fabulous sums for "commercial" extraction.

We'd be surprised if even one small portion of our writings appear as sensible in the light of events fifty-one years hence as Mr. Stedman's do today. Here's hoping!—N.G.S.

Automatic Tooling for Lathes Developed by Potter & Johnston

AMONG the notable recent advances in automotive manufacturing processes is the development of automatic tooling for a group of machines which might be typified by the heavy duty turret lathe. An excellent example of this is the tooling recently developed by the Potter & Johnston Machine Co. for performing a number of boring and finishing operations on a tractor transmission housing for the Amtorg Trading Corp. representing the U. S. S. R.

Fig. 1 shows the rough and finished views of this housing which is of cast iron.

The tooling was laid out on an automatic indexing fixture for the P & J 5D automatic. A preliminary operation is the drilling of one hole on another machine to provide a locating point for the major operations. In setting-up, the housing is fitted in the special fixture, locating positively in a ring on the 260 mm. diameter and held back with a clamping flange. The machining operations following in the sequence corresponding to the cutting speed and feed

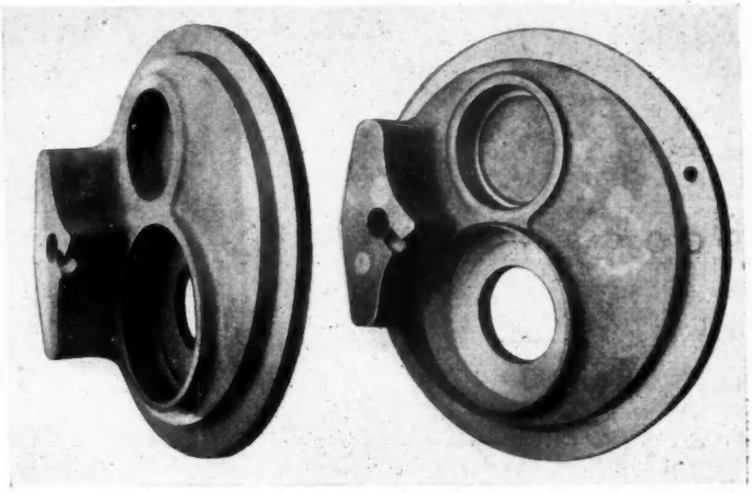


Fig. 1—Tractor transmission housing—rough piece at the left and finished view at the right + +

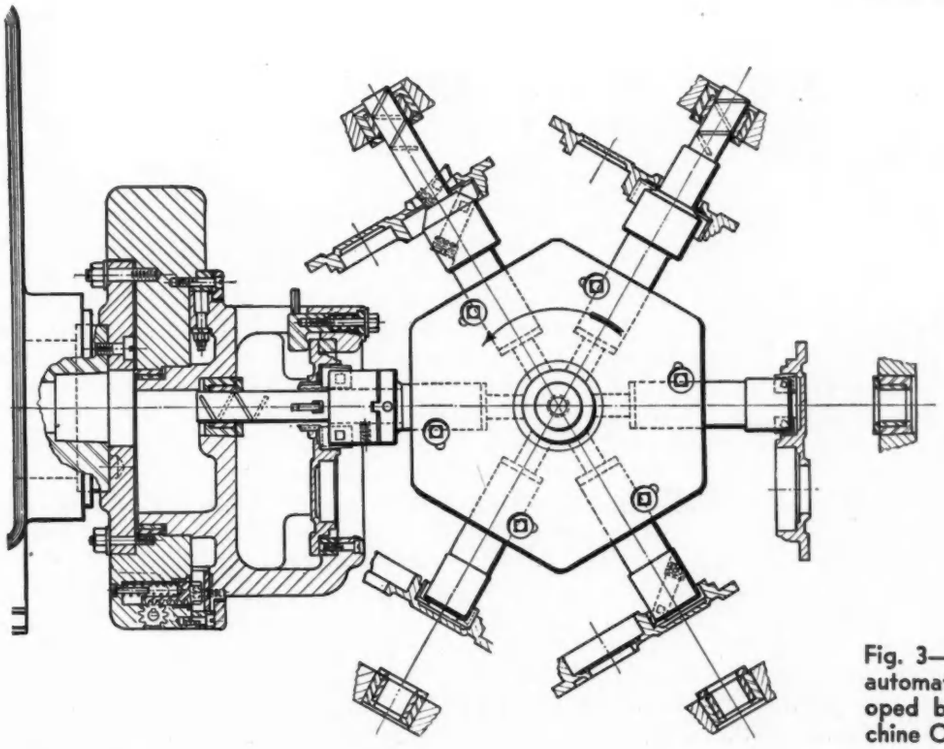


Fig. 3—Complete tool layout for automatic indexing fixture developed by Potter & Johnston Machine Co. + + + + +

data in Fig. 2 are given in detail as follows:

1. Rough bore the 125 mm. and 69.85 mm. diameters and rough face bottom.
2. Finish the cuts in operation 1.
3. Ream the 125 mm. and 69.85 mm. diameters.

Between the third and fourth operations the fixture indexes and the succeeding operations are performed.

4. Rough bore and face 90 mm. diameter.
5. Finish bore and face 90 mm. diameter.
6. Ream 90 mm. diameter.

Fig. 2 gives in detail the cutting speed and feed data established to be most efficient for each operation as well as the estimated figures for total times. A composite plan of the tooling as well as the function of each individual spindle is shown in detail on Fig. 3. Total floor to floor time per piece is about 5½ min. and average production per hour is estimated at about 9.3.

Fig. 2—Cutting Speed and Feed Data

Turret Face	Speed in Ft. Per Min.	Spindle R.P.M.	Feed Per Rev.	Length of Cut in In.	Time Req. for Cut in Min.
1st	52	40	.043	1.25	.74
1st	52	40	.022	.25	.28
2nd	97	75	.034	1.25	.49
2nd	52	40	.022	.125	.14
3rd	97	75	.043	1.375	.42
4th	42	40	.043	1.50	.86
5th	77	75	.034	1.375	.55
6th	77	75	.043	1.375	.42
Allowance for turret revolve					.60
Total					4.50
Allowances for chucking and indexing..					1.00
Average time per piece floor to floor complete					5.50

Pieces per hour per machine figuring 85 per cent efficiency, 9.3.

Books for the Business Bookshelf

Weld Design and Production

By Robert E. Kinkaid. Published by The Ronald Press Co., New York.

THIS book discusses welding in a rather philosophic and general way, avoiding the mass of detail that usually characterizes the strictly technical work. According to the author, it was written primarily for two groups, namely, engineers who are responsible for satisfactory and safe welds, and business executives who are responsible for the cost elements of welding jobs. One chapter, "Why Welds Are Made," is written in a Wonders-of-Industry style, industry being replaced by welding in this case. Other chapters are on "How Welds Are Made," "Effects of Physical Conditions on Weld-Behavior," "Reproduction of Weld Sections," "Actual Welding Conditions," "Welding Procedure Control," "Machine Welding" and "Research and Development."

Engineering Kinematics

By William G. Smith, professor of Engineering Drawing at Northwestern University. McGraw-Hill Book Company, Inc., New York.

THIS is a textbook on Kinematics for use in colleges, a large number of questions being appended to each chapter. The subject, however, is handled in a manner different from that employed in the conventional textbook on kinematics. The author states in his preface that rather than being guided by existing treatises on the subject, he has made chief use of the vast treasure house of industrial literature existing in catalogues, bulletins, handbooks and magazine articles. There is evidently room for a difference of opinion as to whether this method yields a better textbook than the classical type. It does not seem to the reviewer that the profuse use of catalogue illustrations of complete machines sandwiched in between kinematic diagrams, without any reference to these illustrations in the text, serves a useful purpose. For instance, between Fig. 7, which is a diagram showing the motions of various points in parts of the crank train of a steam engine, and Fig. 11, a diagram showing the directions of the various forces active in such a crank train, there are halftone views of a punch press, a planer and a shaper (Figs. 8, 9 and 10) to which there is absolutely no reference in the text.

Aviation Industry Has Open Mind on Design Changes

(Continued from page 343)

engine, from installation to installation, and with variations in climatic conditions.

The anti-knock value would seem to be the most concrete characteristic of an aviation fuel, yet, as pointed out by Mr. Heron, Mr. Parkins and Mr. Geisse, fuels for which the same anti-knock value has been obtained by different methods do not behave identically in practice. Benzol, it was pointed out, is less satisfactory as a dope than tetra ethyl lead, because its use is accompanied by higher cylinder-head temperatures. If head temperatures are to be taken as a criterion—and Messrs. Heron, Parkins and Aldrin believed excessive head temperature was the cause of failure in most detonating engines—this would automatically eliminate benzol as an anti-knock. Messrs. Heron and Parkins actually went so far as to advise against its use. The lack of a standard, acceptable method of anti-knock rating further complicates the picture.

Standard Temperatures Required for Accurate Parts Inspection

Ford Motor Co. finds it necessary to build special enclosures, with air controlled, for the checking interchangeability of pistons, piston pins, connecting rods and crankshafts + + + + + + +

Company found plug gage varied one-tenth in range of 10 to 15 deg. Fahr.

IT is easy to specify that a piston pin should be held to so much for diameter within a tolerance of say one or two ten-thousandths, and that the corresponding hole in the piston should be held to within three or four-tenths of a specified size. But when it is considered that different materials have different rates of expansion, it will be quickly realized that unless these tolerances are specified in relation to some definite temperature, that the prime object in specifying to such close limits—interchangeability—is not attained.

Let us suppose that there is a difference of 13 deg. between either the two places or between the different intervals at which a piston pin and an aluminum alloy piston are inspected for size. The piston pin hole at the higher temperature will have been found to have expanded two ten-thousandths even in this small range. At least that is what experiments carried on by the Ford Motor Co. some time ago showed.

It was evident then that there was quite a possibility that by adhering closely to specified tolerances, that pistons which, if inspected under one temperature would have passed, would be rejected, and vice versa. When it is also considered that a go-no-go plug gage would expand or contract one-tenth in a range of about 10 to 15 deg. Fahr., the futility of specifying the rejection of such a gage when it has worn a half-thousandth, as is often done, may be appreciated.

It became evident to the Ford Motor Co. therefore that the maintaining of high degrees of accuracy and interchangeability of parts within these limits, would require the relating of all key inspections to a standard and definite temperature. This led them to the building of inclosures for the inspection of such parts, and the controlling of the temperatures within these rooms to a definite value. As Johansson Gage blocks form an important item in the set-up of their inspection department, Johansson's normal temperature (68 deg. Fahr.) was adopted as the standard for these inclosures as well as for the room in which gages themselves were checked, so that everything becomes related on the basis of a standard temperature.

The method of controlling the temperature is by means of a constant supply of fresh air to each of the inspection rooms by individual systems, individually controlled. Air is forced in by means of a Sirocco fan, being drawn first through an air washer, and then through steam coils. The water used to wash the air is in a closed system, part of which consists of a tank containing brine coils. A thermostatic valve in the inspection room controls the temperature of the incoming air by regulating the flow of the cooling brine and steam through their respective coils. The washing water normally has a temperature around 40 deg. Fahr.

Parts enter the inspection inclosures (piston pins, pistons, connecting rod and crankshafts are the various parts) on conveyors and leave them in the same manner, the conveyor openings being semi-sealed with cloth shields but serving as an outlet for the surplus air. As a rule the supply of parts in the inspection rooms is about 40 minutes ahead of inspection, so that they can adjust themselves to the standard inspection room temperature.

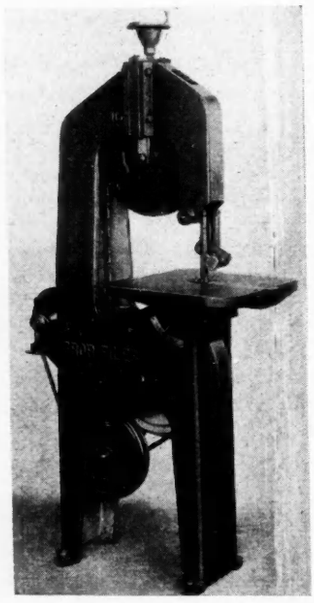
Ford Plant at Cologne Includes Manufactures

THE German Ford Motor Co. has issued a statement to the effect that the rumor that the proposed plant in Cologne would not be built was groundless. Of the total of 70 acres located on the Rhine, 10 acres will be immediately covered with buildings. It has been decided not only to assemble in Cologne but also to manufacture, including the engine, with the exception of very few parts. A production of 150 vehicles per day is planned and not only the German market but the markets of Czechoslovakia, Austria and Hungary are to be supplied from Cologne.

NEW DEVELOPMENTS—AUTOMOTIVE

Grob Continuous-Type Filing Machine

THREE speeds, 170,, 195 and 220 ft. per min. respectively and a Tex-rope reduction drive feature the model No. 1 continuous type filing machine recently placed on the market by Grob Bros., West Allis, Wis. Among other useful applications, it is well adapted for the manufacture of special tools, dies and the filing of internal holes.



The continuous file chain is made up of a series of links which operate on two sheaves, one located in the base of the machine, which is the driver, the other located in the head, which is the idler. Adjustment to compensate for correct filing tension is obtained by a hand wheel located on the top of the head. A heavy helical spring is used to maintain the proper tension and to act as a cushion for maintaining a uniform drive. Either flat, half round or specially formed filing chains can be used. The filing table, which is 16 x 20 in. in size, is mounted on to the frame by means of two hinge-pins, arranged so that the table can be tilted in either direction. The total movement of the table is 22½ deg. in either direction.

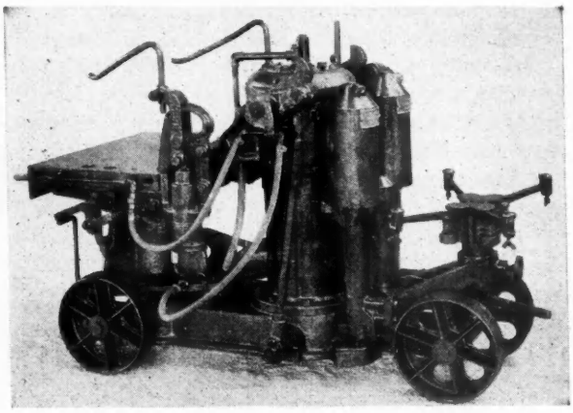
The overall height of the machine is 61 in. The total weight uncrated is 400 lb. The approximate floor space required is 12 x 19 in.

Tabor Plain-jarring Pattern Draw Molding Machine

A NEWLY designed plain-jarring, rollover, pattern draw molding machine is announced by The Tabor Mfg. Co., Philadelphia, Pa. This machine has a rollover plate 18 in. x 28 in.—8 in. pattern draw and is equipped with quick acting air clamps and cradle elevator. The operation of rolling the mold over is controlled by air on oil. This permits maximum speed with absolute safety. Under full load, the machine will roll over in 4.8 seconds and yet should a pipe line burst with the mold at the top of the arc, it could drop either way without danger of breakage to the machine.

The pattern drawing operation is also controlled by air on oil. This eliminates all tendency to jump and permits the operator to control the speed of draw to suit the particular pattern being used. The cradle elevator is supported on ball bearings fully encased, protected from sand and requiring no lubrication. The leveling device is entirely automatic. With the mold rolled into the pattern drawing position, the cradle elevator is raised. As soon as the leveling device makes contact with the mold, the cradle elevator automatically stops with the leveling device locked in position to conform to the contour of the bottom board, and holds the mold in an absolutely level position. Air operated flask clamps are provided which are practically instantaneous in operation.

Clamping and unclamping, rolling over, drawing the pattern and rolling the mold back are all

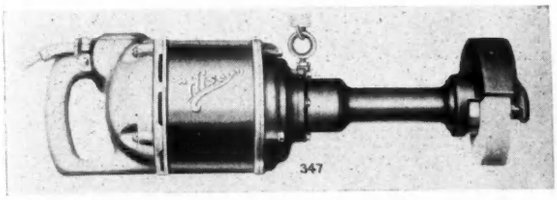


controlled centrally from the pipe stand. Once the bottom board is in place, the operator steps to the pipe stand and does not have to move again until the mold is completed and ready to be carried out.

"Hisey" Heavy Duty Portable Grinders

HAND grinders of 1 hp. and 2 hp. capacity, available for both D. C. and A. C. current, are being marketed by The Hisey-Wolf Machine Co., Cincinnati, Ohio. The single phase A. C. machines which may be operated from a lamp socket are equipped with improved commutating type repulsion induction motors, which have no

PARTS, ACCESSORIES AND PRODUCTION TOOLS



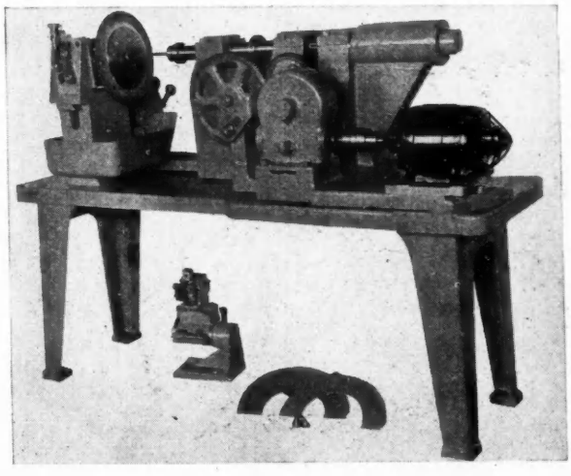
dragging centrifugal switch. They will start and pick up speed instantly under any load within twice their rated capacity. Starting current under all conditions is said to be unusually low. Low voltage so often encountered due to line drop and other existing conditions which cannot always be overcome is said to have no objectionable effect on these new single phase machines.

The 1 hp. grinder in both A. C. and D. C. models has a no load speed of 3400 r.p.m. Net weight is 90 lb. Length over all 31 in., and maximum diameter 8⅝ in. The 2 hp. grinder weighs 127 lb. net, is 32 in. long and 8⅝ in. diameter for both A. C. and D. C. styles. No load speed for the D. C. machine, 2200 r.p.m.; for the A. C. machine, 1800 r.p.m.

Wells Thread Grinder For Taps and Gages

THE "Wells" Thread Grinder designed for grinding taps, thread gages and other screw threads to close limits, up to 2½ in. diameter and with a threaded portion 3½ in. long, is offered by the Wells Manufacturing Company, Greenfield, Mass. Straight or tapered work may be ground with either right-hand or left-hand threads.

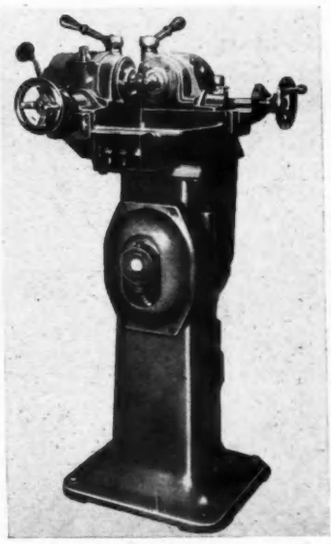
The work to be ground is mounted between centers and revolves at a selected speed, as it traverses under control of a lead screw past the grinding wheel. The grinding wheel is mounted on an individually motor-driven spindle, which may be inclined to the proper helix angle. The wheel cuts continuously on both forward and reverse passes of the work.



Two individual motors are used, one for the work drive and the other for the grinding wheel. These may be of any standard voltage. Floor space required is 26 x 65 in. Net weight is 1400 lb.

Gleason Works 3 in. Bevel Gear Testing Machine

THIS machine designed to test the running qualities of straight and spiral bevel gears of the smaller sizes whose shafts intersect at 90 deg. is announced by the Gleason Works, Rochester, N. Y. Bevel gears are tested by running them together in pairs or with a reference gear and with or without load as desired. The load can be applied manually by a brake operating on the driven spindle or can be set for a fixed amount.



The drive or pinion spindle is power driven and is operated in either direction by a push button control. It is mounted in the pinion head, which is adjustable horizontally on the frame by means of a handwheel and lead screw graduated to show 0.001 in. Operating speeds are 3000 and 4500 r.p.m. The driven or gear spindle is mounted in an eccentric which permits a slight height adjustment, either above or below center with reference to the axis of the drive spindle. With this adjustment the operator can obtain any desired location of bearing on the gear teeth of the gears being tested. It may also be used to compensate for wear in the ways of the machine.

This machine is arranged for a belted motor drive. A ½ hp., 1500 or 1800 r.p.m. motor and reversing push button control are built into the machine. Floor space required is 26 x 26 in. Net weight is 550 lb.

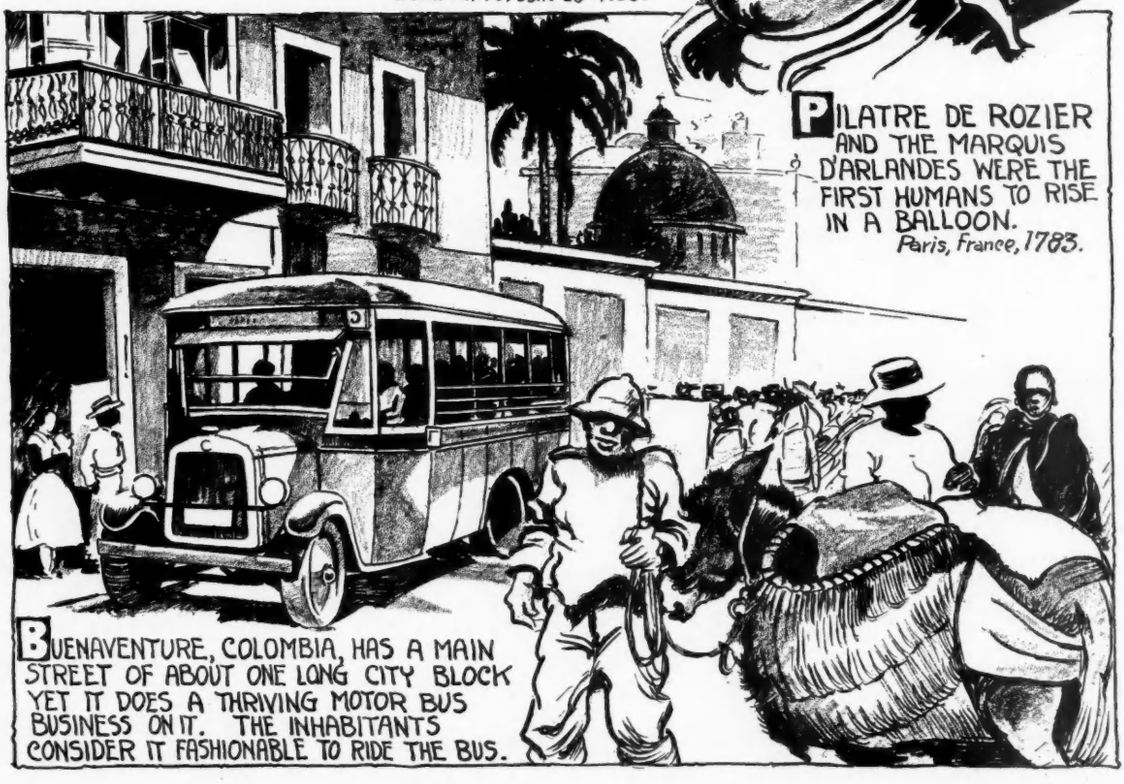
Automotive Oddities — By Pete Keenan

TO AVOID DANGER FROM DISEASE, HORSE VEHICLES ARE BANNED IN THE GREAT MARKET CITY OF MELBOURNE AUSTRALIA.

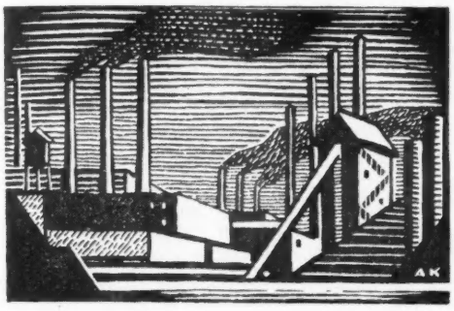
GOVERNMENTAL STUDIES INDICATE THAT IT COSTS AN AVERAGE AUTOMOBILE APPROXIMATELY 2.06 CENTS MORE PER MILE TO DRIVE ON AN EARTH ROAD THAN ON A HARD SURFACE ROAD.

AN AUTOIST SMASHED A ROAD BEACON AT NIGHT, HE SWEPT UP ALL THE GLASS, THEN PHONED POLICE HE WAS COMING AROUND TO PAY FOR IT.
Elizabeth, N.J., June 28th 1930.

PILATRE DE ROZIER AND THE MARQUIS D'ARLANDES WERE THE FIRST HUMANS TO RISE IN A BALLOON.
Paris, France, 1783.



BUENAVENTURE, COLOMBIA, HAS A MAIN STREET OF ABOUT ONE LONG CITY BLOCK YET IT DOES A THRIVING MOTOR BUS BUSINESS ON IT. THE INHABITANTS CONSIDER IT FASHIONABLE TO RIDE THE BUS.



NEWS OF THE INDUSTRY

National Air Races Test Many Planes

Seen in Retrospect As Field Laboratory For Making Comparisons

By Athel F. Denham

CHICAGO, Sept. 2—If the 1930 National Air Races, which were concluded in Chicago Sept. 1, did nothing else, they did succeed in attracting to one area where they might be comparatively studied, most of the developments of the past year in aircraft design. And the comparison proved decidedly interesting. If the various planes exhibited at Chicago, and the interest in the more unusual designs can be taken as a criterion, there is a somewhat equal division of opinion as regards the desired characteristics in the plane of the future.

On the one hand, was the evident desire for higher cruising speeds, exemplified by the several Lockheed ships present, the low-wing Travel-Airs, especially those of the Shell Oil Co., piloted by Jimmy Doolittle and James Haizlip, and of the Texas Oil Co., piloted by Frank Hawks of Transcontinental record fame, and a number of other interesting designs, not the least of which was a small Cirrus-engined low-wing monoplane piloted by B. O. Howard, the designer and builder.

On the other hand, and of rather more interest to the engineering fraternity, due to the possibilities of future development involved, were those planes in which a frank attempt for lower landing speeds was embodied. Among the planes standing out in this group were the now well-known Pitcairn-LaCierva Autogiros, the MacDonnell Doodlebug, with its leading edge slots and wing flaps, and a new cabin plane designed by W. D. Waterman, incorporating variable incidence wings to obtain a high lift for landing, climb and take-off without sacrifice in the maximum speed. The low-landing-speed ships exemplify one of the two opposed views on "safety" current in the aircraft industry, the one that bases this factor on the ability of a ship to land in a small space with only a short roll. The other view of course is that "safety" is inherently tied up with speed in flying.

(Continued on page 354)

Great Lakes Steps Up

CHICAGO, Sept. 3—Operations of the Great Lakes Aircraft Corporation have been doubled since Aug. 1 and an additional night force may be needed, B. F. Castle, president, asserted yesterday. The company is understood to have received a large construction contract from the United States Navy.

Appeals to German Owners

PHILADELPHIA, Sept. 3—The president of the Automobile Club of Germany, the former Duke Adolf Frederick of Mecklenburg, has issued an appeal to all members to drive only German automobiles and to use German tires and German equipment. The appeal is motivated by the present economic stress in Germany.

Hutto Gets Receiver

DETROIT, Sept. 4—Following application by the Board of Directors, Joseph A. Carlin of Cleveland has been appointed temporary receiver of the Hutto Engineering Co., manufacturers of cylinder grinding machines. Business depression with diminishing sales were the reasons given for the proceedings before Judge Allan Campbell of the circuit court.

Mayo Heads Air Board

DETROIT, Sept. 4—William B. Mayo, chief engineer, Ford Motor Co., was reelected chairman of the Michigan State Board of Aeronautics at a meeting held yesterday. Mr. Mayo became chairman of the board shortly after its organization last year.

Bohn Reduces Dividend

DETROIT, Sept. 4—Bohn Aluminum and Brass Corp. has reduced the annual dividend rate on its common stock from $3 to $1.50 by declaring a quarterly disbursement of 37½ cents, payable Oct. 1, to stockholders of record Sept. 15.

National Battery Holds Up

CHICAGO, Sept. 3—Business of the National Battery Company is running at about the same rate as at this time last year, F. M. Brown, secretary, announces.

July Output Placed Near 240,100 Units

N.A.C.C. Estimate Represents 12 Per Cent Drop From July Figure

NEW YORK, Sept. 4—Production of cars and trucks in the United States and Canada for the month of August is estimated to have reached a total of 240,100 units by the National Automobile Chamber of Commerce. This compares with 272,551 units produced during the month of July and with 512,842 units produced during the month of August, 1929.

August production was forty-one per cent below average August production for the past five years and 12 per cent below production for July of this year. Production for the eight months ended with August was 2,842,884 a decline of thirty six per cent from eight months production last year and fifteen per cent below the five year average for eight months.

Directors of the National Automobile Chamber of Commerce at a meeting yesterday, decided to hold the October members' meeting during the week of Oct. 6 in Washington, where they will have an opportunity to attend the International Road Congress in session at that time. Drawing for space in the national shows will consequently be held in Washington during that week. National Automobile Chamber of Commerce members who are interested in the road congress will have an opportunity to meet delegates attending this congress from 61 countries and the League of Nations. It is expected that they will be given an opportunity to meet President Hoover and they will also attend the formal state affair given by the Secretary of State.

Gem Company Sold

CHICAGO, Sept. 4—The Gem Auto Devices Company, 2018 W. Lake St., manufacturers of automobile accessories and novelties, has been acquired by the Krone-Sebek Die Casting & Mfg. Co. of Chicago, Ill., which will continue the manufacture of the line of radiator ornaments and other accessories formerly produced by the Gem Co.

Men of the Industry

Mitchell and Morse to Sail

W. Ledyard Mitchell, chairman of the board, and E. C. Morse, president of the Chrysler Export Corp., will sail from New York on the Aquitania, Sept. 10, for a brief tour of England and the continent. They will attend the Paris Salon and the London Olympia. In Paris they will address a meeting of Chrysler Export distributors and dealers from England, the continent and North Africa. They plan on returning to this country early in November.

Reo Appoints Wood

Appointment of Wilmer Wood as district manager of the Reo Motor Car Co. for California, Arizona and Nevada is announced by W. A. B. Hanchett, Reo regional manager for the Pacific Coast region.

This marks Mr. Wood's return to a territory in which he has served Reo interests for almost 14 years.

Birkigt and Thiry Honored

Mark Birkigt, designer of the Hispano-Suiza aircraft engine and the automobile of the same name, and M. Thiry, inventor of the Silentbloc rubber spring connection, have been named members of the French Legion of Honor.

Blanchard Shifts Office

F. E. Blanchard, in charge of dealers and service parts organizations and the power unit division of the Climax Engineering Co., of Clinton, Iowa, and Chicago, will make his headquarters at the company's main office in Chicago.

Fog Flying Tests Made in England

WASHINGTON, Sept. 4—Success in combating the fog menace was recently achieved in a British experimental flight when a pilot of the Royal Air Force, carrying a passenger, made five safe landings through a fog which rose 90 feet above the ground, according to a dispatch received in the Department of Commerce from Assistant Trade Commissioner H. C. Schuette at Paris.

The equipment consisted of a small anchored sighting balloon 400 feet in the air and one-half a mile from the airport; a pitch and yaw indicator on the dashboard and a weight suspended by wire a few feet below the landing wheels.

After getting above the fog the pilot made use of the known height and position of the balloon for his landing, glided past the balloon at an angle indicated by instruments, and landed with the aid of a lamp lighted red on the dashboard when the weight suspended below the plane touched the ground. The several successful landings were considered highly satisfactory.

Fred J. Weiss Dies

DETROIT, Sept. 2—Fred Jacob Weiss, early business associate of W. C. Durant and former president of the Flint Motor Axle Co., died at his home in Flint, Mich., yesterday, after an illness of several months. He was 57 years old. Mr. Weiss, who was born in Springdale, near Pittsburgh, Pa., went to Flint in 1900. He was general manager of the Durant Dort carriage factory there when the company was dissolved in 1911. Later he became president of the Walker-Weiss Co., automobile axle makers, and he continued in that office when the company was reorganized under the name of the Flint Motor Axle Co. in 1926.

Wisconsin Axle Adding

MILWAUKEE, Sept. 2—Expressing faith in the outlook for a marked increase in business during the fall and winter, Walter F. Rockwell, vice-president and general manager of the Wisconsin Axle Co., Oshkosh, Wis., has announced plans for the immediate construction of a new machine shop building, 100 ft. x 150 ft., one-story. It is to be ready about Oct. 15.

Overseas Club to Meet

NEW YORK, Sept. 2—The Overseas Automotive Club will hold its first fall meeting on Thursday, September 11, at the Hotel Astor. George E. Quisenberry, of *The American Automobile*, will talk on South America, and V. A. Dodge, head of Dodge & Seymour, will talk on the Far East.

Ford Milwaukee Plant Projects August Schedule

MILWAUKEE, Sept. 2—The Milwaukee Ford plant's schedule for September has been fixed at 1200 cars, the same as the August output, it is announced by L. T. Henderson, plant manager. When the plant reopened recently after a vacation period, it was announced that the August output had been fixed at 1200 cars, with the expectancy of stepping up production in September.

Mail Applications for Show Space

Parts and Equipment Makers Invited Early

NEW YORK, Sept. 3—Applications for space in the New York and Chicago national automobile shows, to be held Jan. 3 to 10 and Jan. 24 to 31, respectively, are now being mailed to manufacturers of parts and equipment.

The Motor & Equipment Association is mailing application blanks to all its manufacturing members, together with floor plans and space available for this part of the show. The National Automobile Chamber of Commerce is also mailing out applications to manufacturers who are not members of the M.E.A. but who would be interested in space at the shows.

Drawings for space by car makers will take place at a later date and at that time it will be known how much space is available over and above that required by the car makers for cars and such trucks as are to be shown.

As usual, the entire fourth floor and a portion of the third floor of Grand Central Palace in New York will be turned over to the parts and accessory and equipment manufacturers.

Chick Sees Improvement

DETROIT, Sept. 2—Definite signs of immediate improvement in the low-priced automotive field were noted by J. C. Chick, assistant general sales manager of the Chevrolet Motor Co., during a recent field survey which brought him into contact with every major marketing area east of the Mississippi.

Sales are picking up. Stocks are in satisfactory shape. And the relation of new to used car stocks is in decidedly better proportion than in 1929.

"Perhaps the most noteworthy sign, however, is the confident attitude voiced by business leaders I spoke with during the trip," Mr. Chick said. "Merchants, bankers, professional men everywhere seem to feel sure of an improved fall and winter."

No Changes in Durant of Canada

MONTREAL, Sept. 2—No change will be made in the directorate of Durant Motors of Canada, Ltd. as a result of the reorganization of the American company, according to Roy D. Kerby, president and general manager of the Canadian company. Mr. Kerby stated further that the Canadian company does not contemplate manufacturing this car.

Mack Declares Dividend

NEW YORK, Sept. 4—Mack Trucks, Inc., has declared regular quarterly dividend of $1.50 payable Sept. 30 to stockholders of record Sept. 15.

Italian Cars Sweep Tourist Trophy Race

Win First Three Places and Team Prize in Irish Event

LONDON, Aug. 24 *(by mail)*—The ninth Tourist Trophy race organized by the Royal Automobile Club, and the third to be run on the Ards Circuit near Belfast, was won yesterday by Nuvolari on a 1¾ liter (1750 cc.) supercharged Alfa Romeo at 70.88 m.p.h. Campari at 70.82 m.p.h. and Varzi at 70.31 m.ph also on 1¾ liter Alfa Romeos were second and third respectively. These three also won the team prize. A supercharged eight-cylinder (1½ liter) front drive Alvis was fourth at 69.61 m.p.h. and a supercharged Austin Seven fifth at 61.46 m.p.h.

A sensation was caused on the evening preceding the race by the withdrawal of Carraciola and his 7 liter Mercedes owing to the stewards refusing to allow him to run with the supercharger that was fitted; it was found to be larger than the type fitted as standard to this model, and the race was confined to standard models with no other than clearly specified permissible modifications.

Carraciola was given an opportunity of fitting a standard size of supercharger (one was available) but he refused to do so and withdrew. Earl Howe and Captain Malcolm Campbell on identical cars with superchargers of the standard size competed, but the former failed to finish and the latter could do no better than secure tenth place at 71.53 m.p.h., which speed was not good enough to win because of the start that the Mercedes had to concede to all the other competing cars. Carraciola won last year at 72.82 m.p.h., Campari (Alfa Romeo) being second at 67.54 m.p.h.

Part of the race (410 miles in all for the scratch cars) was run in a downpour of rain, during which Kaye Don on an Alfa Romeo overturned at a corner and was only dragged from under his car in the nick of time while it was blazing. Captain Birkin on a Bentley while lapping at 75-76 m.p.h. in a dual with the Alfa Romeos charged a wall for some reason still to be determined (it was not a skid); Peacock on a Lea-Francis skidded into a butcher's shop in one of the three small towns on the course and Captain Waite (a fancied winner and a son-in-law of Sir Herbert Austin) on an Austin Seven skidded into a bank.

Invents Oscillating Jack

SPOKANE, WASH., Sept. 2—A jack which oscillates and rocks a car on the grease rack so as to break up dried grease between spring leaves and in shackles has been invented by J. A. Schoenberg. Mr. Schoenberg is starting manufacture of the jack, the first installations having already been made at local service stations.

Oliver Passes a Dividend

CHICAGO, Sept. 2—Oliver Farm Equipment Co. directors have omitted the quarterly dividend of 75 cents on the convertible participating preferred, due at this time. The regular $1.50 quarterly dividend on the prior preferred was declared payable Oct. 1 to stock of record, Sept. 10.

Plymouth to Use Shock Absorbers on All Models

DETROIT, Sept. 3—Effective immediately all models of Plymouth automobiles will be factory-equipped with hydraulic type shock absorbers as standard equipment without extra cost, it was announced today by officials of Plymouth Motor Corp.

Indian Plans Issue

NEW YORK, Sept. 4—The Indian Motocycle Co., Springfield, Mass., has applied to the New York Stock Exchange for permission to list 40,000 additional shares of stock, bringing the total of shares listed to 290,000. The additional financing will be used for the retirement of four notes of $125,000 face value each, which figured in the recent acquisition of du Pont Motors, Inc., by the Indian organization.

Hercules Opens N. Y. Office

CANTON, Sept. 4—The Hercules Motors Corp., Canton, Ohio, builders of heavy-duty engines, announces the opening of an office in New York City at Room 427, Chanin Building, 42nd Street and Lexington Avenue. C. P. Weekes, Hercules sales representative and manager of the Eastern territory, will make the newly established New York office his headquarters.

Murray to Suspend Bay City Plant

BAY CITY, MICH., Sept. 4—Announcement was made that the plant here of the Murray Corporation of America will indefinitely suspend operations about Sept. 10, and that orders handled by the division here will be placed with the corporation's unit at Memphis, Tenn.

The announcement was made by C. K. Klix, plant manager. Although the equipment of the plant is to be left here until other arrangements are made for it, the 400 men now on the payroll will be released on that date.

"Operations of the Bay City plant will be suspended," Mr. Klix said, "because it has been determined that they can be carried on more economically at the Memphis unit. I do not know that the Murray plant here will ever be operated as such again. The Memphis unit is not only in a position to buy its material cheaper, but it is also closer to the source of supply."

Miniger Sees Gain for Auto-Lite Co.

Directors Declare Regular Dividends

TOLEDO, Sept. 3—New models being put out by several customers of the Electric Auto-Lite Co. and usual increase in retail battery business is looked to to produce a better business volume in the automotive industry and show satisfactory earnings for Auto-Lite in the fourth quarter, according to C. O. Miniger, president.

Directors meeting today declared the regular quarterly dividend of $1.75 on preferred stock and $1.50 a share on common stock payable Oct. 1 to stockholders of record Sept. 20. Earnings for the six-months' period amounted to $3,733,728.84 or $4.01 a share for the 926,515 shares of common stock after providing for preferred stock dividend requirements. Dividend total $1,468,308.

Gross profit of operations and other earnings amounted to $6,054,400.05. Expenses were $1,643,381.78, depreciation $664,931.66. Interest paid for subsidiary companies was $11,857.74. There was a net profit, before providing for federal income tax, of $3,733,738.84.

The company wrote off extraordinary charges amounting to $368,889, largely resulting from moving into its new plant at Toledo and opening of the new subsidiary at Sarnia, Ont., during the first half of the year.

Earnings during the first nine months will be substantially in excess of dividend requirements.

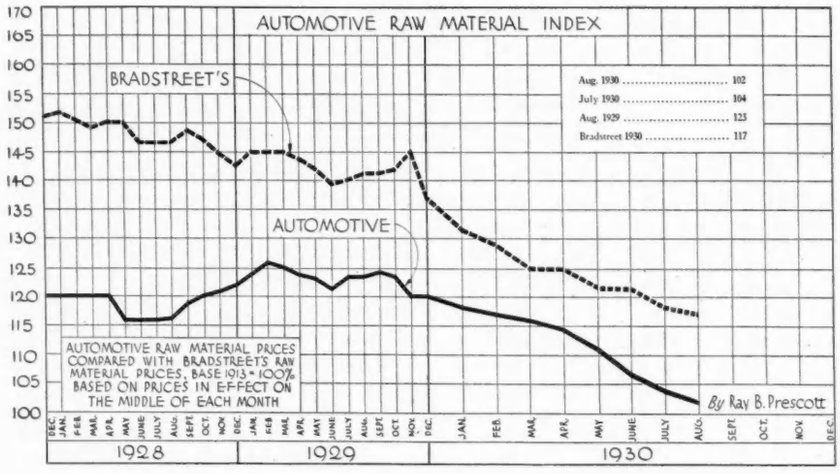
Improvements on R-100

PHILADELPHIA, Sept. 3 — The R-100, one of the two dirigible airships built for the British Government in recent years, has recently been lengthened by installing an additional bay in her framework, which will accommodate an additional gas bag. This will give her additional gas capacity to the amount of 500,000 cu. ft. and increase the lift by 15 tons. Other modifications which have been effected increase the lift by an additional 6 tons. The R-100 is the ship equipped with oil engines, which proved rather heavier and less powerful than expected, lowering the speed and the lifting capacity of the ship. It is stated that originally one of the five oil engines was held in reserve for reversing, but one of the engines has now been converted into a reversible type and all five will be available for forward propulsion in future.

Austin Completes Removal

DETROIT, Sept. 2—With the moving of the office of C. A. Best, general sales manager to Butler, Pa., last week, all the administrative offices of the American Austin Car Co. are centered at the plant in Butler.

Material's Index Still Moves Down


AUTOMOTIVE RAW MATERIAL INDEX
BRADSTREET'S
AUTOMOTIVE
Aug. 1930 102
July 1930 104
Aug. 1929 123
Bradstreet 1930 117
AUTOMOTIVE RAW MATERIAL PRICES COMPARED WITH BRADSTREET'S RAW MATERIAL PRICES, BASE 1913 = 100% BASED ON PRICES IN EFFECT ON THE MIDDLE OF EACH MONTH
By Ray B. Prescott
1928
1929
1930

To Draw for N.S.P.A. Show Space

CHICAGO, Sept. 2 — Drawings for space in the Motor and Equipment Association's annual International Trade Exposition will be held at the Hotel Statler in Detroit on Friday, Sept. 19, at 9 a. m., according to the action of the show committee which met in Chicago on Aug. 25.

The annual exposition is to be held in Cleveland, Nov. 10 to 14.

Buick Salesmen Rewarded

DETROIT, Sept. 2—More than 1500 Buick salesmen throughout the United States are being awarded gold emblem buttons by C. W. Churchill, general sales manager of the Buick Motor Co., in recognition of their achievement in becoming members of the Buick Master Salesmen's Club. This club, founded a little over a year ago, is open only to those Buick salesmen who, through obtaining the required volume of sales, become eligible.

Gar Wood Sets Mark

DETROIT, Sept. 2 — Establishing a new world's competitive speedboat record, Gar Wood in his latest creation, Miss America IX, blotted out the last ray of hope Miss Betty Carstairs had of regaining the Harmsworth trophy, when he averaged 77.390 m.p.h. over the 30 nautical mile course on the Detroit River yesterday. His previous record was 75.287 made in the same event last year. Wood's mechanic, Orlin Johnson, handles the throttle on the Packard powerplant.

To make the conquest of the British challenger, Estelle V, more decisive, George Wood, at the wheel of Miss America VIII, bettered last year's mark by averaging 77.233 over the course. Miss Carstairs, in a prepared statement, announced her retirement as a challenger for the trophy. Bert Hawker, pilot of the British craft, entered the race with instructions to give the boat all it had but after the first lap defeat was obvious.

The challenger, more than three miles behind the Wood brothers, dropped from the course on the fifth lap, its fuel tanks shattered. Gar Wood's highest speed was 79.083, accomplished on the first lap.

Incorporate Airplane Company

CHICAGO, Sept. 2—John Cordon, R. E. Guthier and G. J. Schafer have been granted incorporation papers on the Guthier Airplane Co. They will manufacture and deal in airplanes and flying apparatus. Capitalization is $40,000 and headquarters are at 33 South Market Street.

U.C.C. Passes Half Billion

DETROIT, Sept. 2—Universal Credit Co. reports that its volume of business in financing of Ford cars and trucks passed the $500,000,000 mark today. The company, which started offering the Authorized Ford Finance Plans to Ford dealers and their customers on June 1, 1928, now has 32 complete branches in operation in the United States and Mexico.

Commercial to Finance Air Brakes

CHICAGO, Sept. 2—The Bendix-Westinghouse Automotive Air Brake Company has completed arrangements with Commercial Investment Trust for the financing of time payment sales of its air brakes for trucks and buses.

Buick Shifts Pacific N. W. Zone

PORTLAND, ORE., Sept. 2—Transfer of the Pacific northwest zone offices of the Buick Motor Co. from Seattle to Portland is announced by M. O. Anderson, zone manager. By this move Portland becomes one of 33 Buick zones.

National Air Races Test Many Planes

Continued From Lead News Page

Certainly the accidents occurring at Curtiss-Reynolds Airport during race week still left the question wide open. On the one hand was the fatal accident to George Fernic, in his "tail-in-front" machine. On the other, the crash of Arthur H. Page of the Naval Air Service in his high-speed Curtiss Hawk, in the final event of the program, the Thompson trophy free-for-all race.

Fernic's plane had attracted considerable interest before its crash. It was looked to as one possible step toward the goal of higher aerodynamic efficiency, by making the tail surfaces available for actual lift rather than opposing the lift as in the conventional airplane.

Organized to replace the Pulitzer Trophy races which ended some three years ago, the Thompson Trophy race was intended to afford an encouragement to commercial manufacturers in the designing of ships capable of higher speeds. There has been much criticism in this country of the abandonment of the government's researches in the field of higher flying speeds. That the air services are woefully lacking in high-speed ships has only been too clearly demonstrated by the comparative superiority of such planes as the low-wing Travel-Airs, with their Wright Whirlwind engines, and the Pratt & Whitney powered Laird Swallow, all of which showed speeds in excess of 200 m.p.h. in the Thompson Trophy race.

True enough, the Navy entry piloted by Arthur Page showed the highest speed on the five-mile closed course, before its crash, this ship virtually being a Curtiss Hawk, powered with a Curtiss water-cooled engine developed from the D-12, streamlined in detail to reduce drag, and with the lower wing removed. But this ship was but one example, more than offset by the result of the race for Marine Corps pilots in their supercharged fighters, in which a top speed of only 142.6 m.p.h. was obtained, and that of the Navy Boeing fighters with a winner's speed for the race of less than 126 m.p.h.

Perfex Enters Heater Field

MILWAUKEE, WIS., Sept. 2—The Perfex Corp. of Milwaukee, maker of automobile, truck, tractor and industrial engine cooling systems, has announced its decision to enter the unit heater field, following three years of engineering research. A new production and merchandising division is being set up for this purpose. T. C. Cornell, for many years engaged in air conditioning engineering, is directing the new department.

Passenger Car Sales Slump During July

262,991 Units Were Registered in U. S.

PHILADELPHIA, Sept. 3—Sales of new passenger cars in the month of July in the United States reached a total of 262,991 units, according to an estimate by *Automotive Industries*, based on returns received. This represents a decrease of 41.2 per cent from the sales figure of 447,771 reached during the month of July, 1929.

Sales of trucks for the month of July were 39,888 units, as compared with sales of 57,946 units in the same month of last year, a decrease of 31.1 per cent.

Passenger car and truck sales for June of this year were 266,991 and 33,512 units respectively.

The total of lumped passenger car and truck sales were 302,879 units, as compared with 505,717 units in the month of July last year.

Total foreign sales for the month of July are estimated at 23,556 units as compared with sales of 52,980 units for the month of July last year.

British Truck Exports Gain

LONDON, Aug. 25 *(by mail)*—According to Board of Trade returns, the exports of British trucks and buses for the seven months ended July 31 show a substantial increase in number and value as compared with the corresponding period in the two preceding years. Including fire engines and ambulances, but not tractors, they amounted to 2479 vehicles (value £1,168,131) which compares with 1905 vehicles (value £768,595) for the first seven months of 1929 and 717 vehicles (value £346,233) for the same period in 1928. British India was responsible for the biggest increase, taking 911 vehicles against 449 last year. Australia and New Zealand took very few (11 and 17 respectively). "Other countries" took 1540 as against 1422 and 630 in January-July 1929 and 1928 respectively.

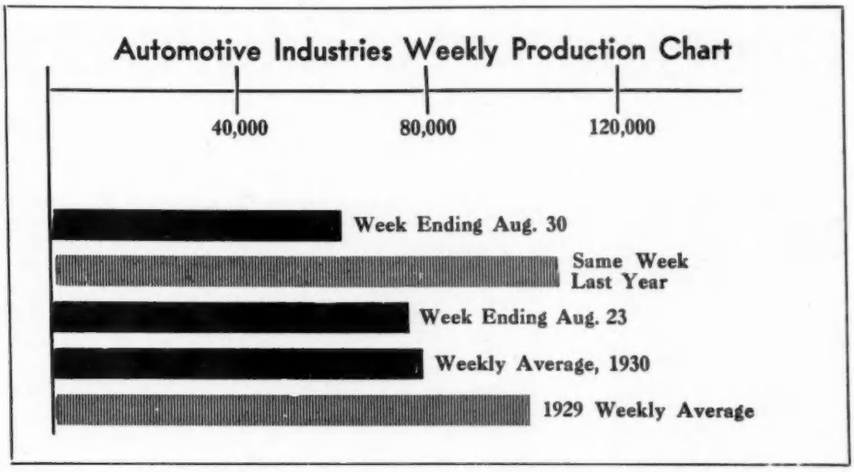
Elizabeth Plant Sold

NEW YORK, Sept. 3 — The Durant motor plant in Elizabeth, N. J., which had been lying idle for nearly two years but which when it was in operation was said to be the largest single unit in use for the manufacture of automobiles in the East, has now passed definitely out of the automobile picture. The plant has been sold to the Bayway Terminal, Inc., New York, which took occupancy yesterday.

They will use part of the building for warehouse purposes and lease the rest to other concerns who will probably use it for similar ends.

Ford Cars Win Prizes

DETROIT, Sept. 4—Ford cars captured first and third prizes in the recent international automobile race staged by the Polish Automobile Club.



Valpey Sees Good Out of Depression

DETROIT, Sept. 2 — That the slack period in the motor industry will prove beneficial to factories, dealers, and public alike, is the opinion of F. R. Valpey, general sales manager of the Graham-Paige Motors Corp.

"Production next year will be regulated closer to retail demand than at any time in the past," Mr. Valpey says. "In fact, since last fall, motor manufacturers have scaled down production in line with retail orders and are not burdening dealers with heavy new car stocks. The dealers naturally are in a position to cut down new car inventories and devote more time to used car merchandising."

Chris Craft Plant Burns

CHICAGO, Sept. 2—Fire which caused a total damage of $1,000,000 swept the plant of the Chris Craft Boat Co. at Illinois Street and Ogden Slip yesterday. The blaze originated from eight explosions of oil and gasoline tanks in the boat company's plant. Flames leaped a forty-foot alley and caused considerable damage to the Curtis Candy Company. The plant of the Gardener Petroleum company was imperiled by the fire. Officials said the blaze was the worst in three years, half the fire-fighting equipment in the city being used to extinguish the flames.

Singer Profits Drop

LONDON, Aug. 25 *(by mail)*—The first of the prominent British motor companies to issue its report for the year ended July 31 is the Singer Motor Co., which ranks well up in the first half-dozen British makers as regards output. In a preliminary report issued today the directors state that the profits for the year were £144,266, which compares with a figure exceeding £170,000 for the two preceding years.

It is considered, however, that when allowance is made for the more difficult trading conditions of the past year this result cannot be regarded as unsatisfactory.

Instead of paying a dividend upon the ordinary shares (last year a cash dividend and bonus equal to 12½ per cent was paid) the directors propose to make a distribution of one preference share for every seven ordinary shares and to retain the amount thus represented (£122,905) as addition to capital account for completion and further extension of the plant and equipment.

Cutler to Sell Reynolds Product

MILWAUKEE, Sept. 2—Cutler-Hammer, Inc., Milwaukee, a leading manufacturer of electrical controlling devices, is continuing its expansion program by acquiring the Reynolite line of bakelite electric products from the Reynolds Spring Co., Jackson, Mich. The Reynolds Company, originally making automobile springs, will continue this line.

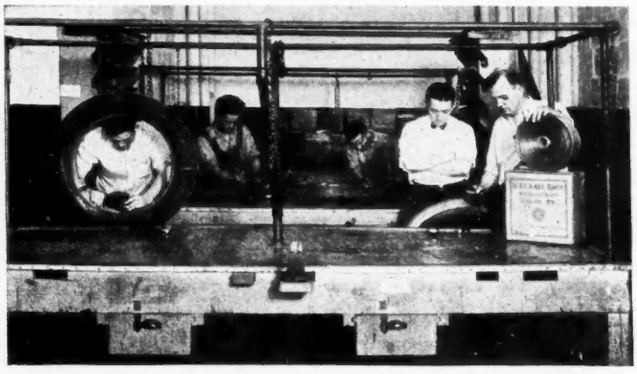
Lansing Employment Better

LANSING, Sept. 4—With the Reo Motor Car Co. calling back their old employees daily, and with the Olds Motor Works and Fisher Body plants in operation again, employment in Lansing's automotive plants is on the upward trend. Employment in the city's 18 major factories, mostly automobile, is now within 543 of the number employed at this time in 1929.

Indications are that the Reo will continue to increase its payroll in the near future because of a new line of passenger cars which will be presented to the public on Oct. 9 through extensive national advertising. Because of the new cars, it is general opinion of local manufacturers that Reo will hold a steady employment figure all winter with further increases in the spring of 1931.

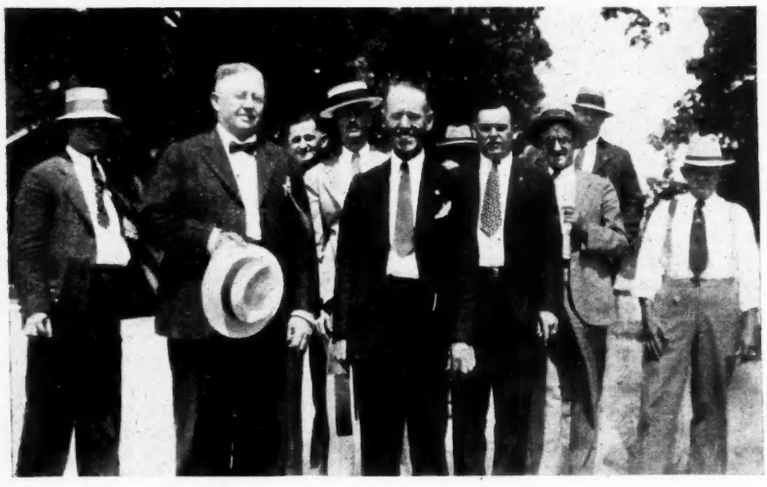
According to present plans, Durant Motors, Inc., now employing slightly more than 500, will have an employment total of more than 3000 in December when production of Mathis cars get under way. Because of the bright industrial outlook in the automobile plants of Lansing, an optimistic spirit is abroad.

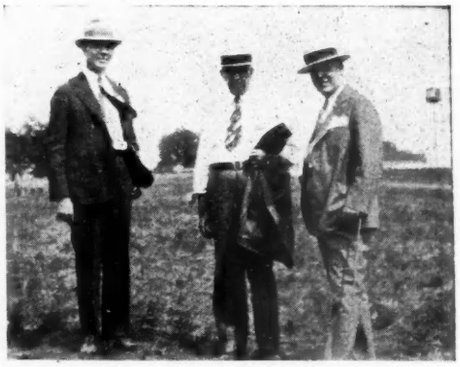
Here and There in the Automotive World



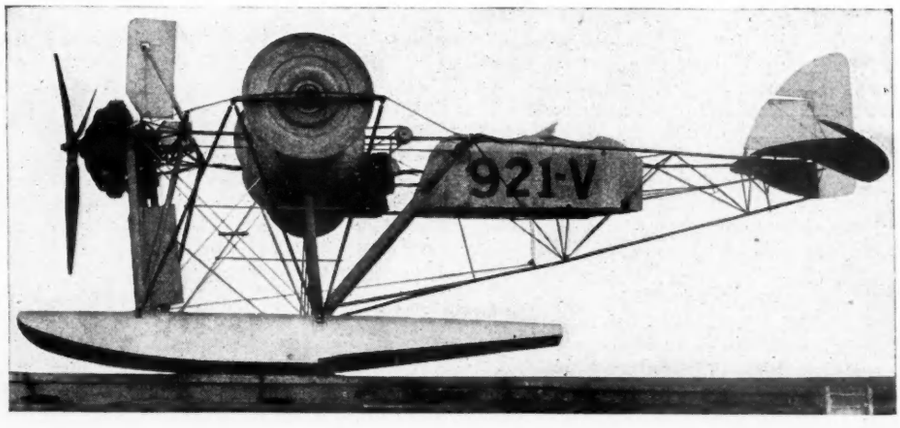
The picture on the far left shows Charles Samson, director of the new tire repair school of the United States Rubber Co. Repairmen from various parts of the country who receive training in the school are shown at work in the nearer picture + +

Joseph B. Graham (center of picture below), president of the Graham-Paige Motors Corp., Detroit, welcomes Frank W. Griese (at his right), Mayor of Evansville, Ind., and group of southern Indiana automobile dealers to the Graham Farms near Washington, Ind., where a farm show in which five southern Indiana counties participated was staged + +





Left to right, above—R. E. Stone, Evansville, Ind., secretary, Graham-Paige Body Corp.; J. A. Sullivan, Detroit, assistant freight traffic manager, Wabash Valley Railroad, and W. H. Lougheed, Detroit, traffic manager, Graham-Paige Motors Corp., at the three-day farm show at the Graham brothers' farm, August, near Washington, Ind. + + + +



A view of the rotorplane, which depends for its lifting power on the rotating cylinders mounted horizontally behind the propeller, engine and vanes in the front of the ship. Development of the plane has been proceeding secretly on a barge on Long Island Sound + + +

Aeronautics Branch Announces Granting of Approved Type Certificates to 5 planes

WASHINGTON, Sept. 2—Approvals and changes in approval of airplane and engine models issued by the Aeronautics Branch, Department of Commerce, during the week ending Aug. 30, 1930, were announced as follows:

Airplanes Issued Approved Type Certificates

Certificate numbers, dates, manufacturers, models, powerplants, and weights (empty, useful and gross) in order named.

354	8-20-30	Great Lakes, 2T-1E, 1POLB, Amer. Cirrus Ensign 95, 1012, 568, 1580.
356	8-23-30	Sikorsky, S-38-BH, 10CAmB, 2 Hornet B's, C575, 5835, 4645, 10480.
357	8-25-30	Fairchild, 51, 5PCSH (P-4 floats), R975, 300 HP, 2702, 1298, 4000.
358	8-25-30	Fairchild, 51-A, 5PCLM, Wasp Jr. 300 HP, 2440, 1480, 3920.
360	8-27-30	Bellanca, 12 PCLM, geared Conqueror 600 HP (Nos. 701 and up), 5490, 4010, 9500.

Changes in Approved Type Certificates for Airplanes

274	11-14-29 8-22-30	Rogers, RB-X, 4POF B, R760 240 HP, 2396, 1034, 3430.
355	8-20-30 8-22-30	Mono-Aircraft, Monocoupe 90J, 2PCLM, Warner Jr. 90 HP, 902, 609, 1511.
228	9-17-29 8-23-30	Great Lakes, 2T-1A, 1-2POLB, Amer. Cirrus 90, 1002, 578, 1580.
306	4-2 -30 8-25-30	Mono, Monocoupe 90, 2PCLM, Lambert R-266 90 HP, 859, 631, 1490.
41	6-18-28 8-25-30	Waco, ASO, 3POLSB (Edo DeLuxe Floats), J5 220HP, Landplane, 1411, 899, 2310, Seaplane 1888, 772, 2660.
1	3-29-27 8-26-30	Buhl, Airster CA3, 3POLB, J5, 220HP, 1686, 1383, 3069.
*71	9-6 -28 8-26-30	Spartan, C3, 3POLB, SH-12, 128HP, 1355, 848, 2203.
203	8-23-29 8-26-30	Aeromarine Klemm, AKL-26, 2POLSH, LeBlond 65 HP, Landplane, 940, 500, 1440, Seaplane (Edo H floats), 1090, 500, 1590.
353	8-20-30 8-26-30	Laird, LCB-300, 3POLB, R975 300 HP, 1958, 1064, 3022.
59	8- 6-28 8-27-30	Alexander, A-3, A-4, 3POLB, Hisso 150-180 HP, 1877, 741, 2618.
156	6 -4-29 8-27-30	Stout (Ford) 5-AT-B 17PCLM-3 Wasp @ 450 HP, 7576, 5674, 13250.
178	7-20-29 8-27-30	Alliance "Argo" 2POLB Hess Warrior 115HP, 1077, 538, 1615, Serial 102 and up, with 8 gal. reserve fuel tank, 1085, 586, 1671.
335	7-10-30 8-29-30	Stinson SM-6000, 11PCLM, 3 Lycomings R-680 @ 215, 5622, 2778, 8400, (with radio installed), 5722, 2778, 8500.

Airplanes Improved for License Without ATC

2-264	8-27-30	Nicholas-Beasley NB-4W, 3 POLM, Warner Jr. 90 HP, 860, 679, 1539.
2-264	8-22-30	Curtiss-Robertson, Kingbird J-2, 8PCLM, 2 R760's @ 240 HP, 6115, G-3.

Changes in Approval of Airplanes for License Without ATC

2-100	3- 4-30 8-23-30	Sikorsky—Superseded by ATC 356.
2-256	8-13-30 8-22-30	Detroit, Vega Special, 5PCLSM, Wasp 420 HP, Landplane, 4265, 102, Seaplane 4698, 102.
2-261	8-20-30	Superseded by ATC 354.
2-183	8-22-30	Superseded by Approval 2-264.
2-259	8-14-30 8-25-30	Fairchild, 51, 5PCLSM (P-4 floats), 4000, 102. R975 300 HP.
2-241	8-25-30	Superseded by ATC 358.
2-189	3- 4-30 8-26-30	Laird, LCB-300, 3POLB, R975 300 HP, 3022, 176, 184, 186.
2-256	8-13-30 8-26-30	Lockheed, Vega Special, 5PCLSM (APC floats No. A-9500), Landplane, 4265, 102, Seaplane, 4698, 102.
2-102	7-30-29 8-27-30	Waco ASO 3POSB, Wright J5 220 HP, 2660, 818.
2-102	8-25-30 8-27-30	Superseded by ATC 41.
2-24	10-24-28 8-29-30	Stinson SM-1 B 6PCLM Wright J5, 220 HP (As 3 place), 3485, 253 & M-241.
2-102	7-30-29 8-29-30	Waco 10 3POS B, Wright J5, 220 HP (Edo DeLuxe Floats), 2660, 818 & A-116.
2-224	6-13-30 8-29-30	Stinson SM-1B Special 5PCLB, J5 220 HP, 3597, M-212 and up.
2-253	8- 9-30 829-30	Fleet 2X Special, 2POLB, Kinner K5 100 HP, 1675, 52.
52		

Changes in Approved Type Certificates for Engines

	8-25-30	LeBlond, LeBlond 110 (7DF), 7RA, 110 HP @ 2150 RPM.
12	11-30-28 8-25-30	LeBlond, LeBlond 60 (5D), 5RA, 65 HP @ 1950 RPM.
31	2- 7-30 8-25-30	Jacobs, LA-1, 7RA, 140 HP @ 1800 RPM.
46	4- 8-30 8-25-30	LeBlond, LeBlond 85 (5DF), 5RA, 85 HP @ 2125 RPM.
20	2 -6-29 8-25-30	LeBlond, LeBlond 90 (7D), 7RA, 90 HP @ 1975 RPM.

Southern Woods in Light Demand

MEMPHIS, Sept. 2 — Concerns in the Memphis area making automobile body parts are fairly active; mill production in hardwoods is light but demand also light, little export trade. A more active market expected in mid-September.

Yacht Wins Trophy

CHICAGO, Sept. 2—Dr. O. E. Nadeau's yacht Alice Dee of the Chicago Motor Yacht Club won the Chicago to Waukegan power yacht race and the syndicate trophy.

Arnold Clinches AAA Racing Title

Wins at Altoona On Labor Day

ALTOONA, PA., Sept. 1 — Billy Arnold, Chicago speed king, won the Labor day race on the board oval here today, finishing ahead of Deacon Litz, of Dubois, Pa.

The event was scheduled for 200 miles, but was stopped after 116¼ miles when the rain, which had threatened to postpone the race from the start, broke into a heavy shower and made completion dangerous and impossible.

Arnold completed the 116¼ miles in 1 hour and 1 minute, an average of 113 miles an hour. The victory gave him 139 points and increased his season total to 1027.

Shorty Cantlon, of Akron, Ohio, his nearest rival for the 1930 A.A.A. championship, won 104 points by placing third today and increased his season total to 584.

Ted Allen, secretary of the A.A.A. contest board, said Arnold's triumph today guaranteed him the 1930 title since Cantlon, by winning the remaining official event at Syracuse next Saturday, could add only 120 points and could not overtake Arnold.

R. J. Firestone Dies; Brother of Harvey

CLEVELAND, Sept. 2—Funeral services for Robert J. Firestone, president of the Standard Tire Co. of Willoughby, who died in his fifty-eighth year of a heart attack Monday night, will be conducted Thursday.

Mr. Firestone was a brother of Harvey J. Firestone, president of the Firestone Tire & Rubber Co. of Akron, and until 1919, when he organized the Standard Tire Co., he was vice-president and general sales manager of the Firestone company.

Mr. Firestone was born in Columbiana, Ohio, in 1873. At 20 he joined his brother Elmer in the tire business at Des Moines, Iowa. When Harvey S. Firestone went to Chicago in 1895 he joined him there as a salesman, returning with him to Akron to organize the present Firestone company.

He was first appointed Chicago branch manager, returning to Akron in 1907 to be general sales manager. In 1916 he was elected vice-president.

Chrysler Ships 18,184

DETROIT, Sept. 3 — Shipments of Chrysler-built passenger cars, trucks, buses, motor coaches and taxicabs, totaled 18,184 during the month of August. It is estimated by officials that August deliveries of Plymouth cars to the public equaled 94 per cent of last year's record and were more than 6 per cent greater than 1928 sales during the corresponding period.

Gasoline Consumption by States Shows Increase in Month of June

Figures Courtesy of American Petroleum Institute

	Tax Per Gallon Cents	Month of May, 1930 Gallons	Month of June, 1930 Gallons	Month of June, 1929 Gallons	6 Months Ending with June, 1930 Gallons	6 Months Ending with June, 1929 Gallons
Alabama	4	15,083,000	14,772,000	14,715,000	85,593,000	83,506,000
Arizona	4	6,444,000	6,566,000	6,138,000	38,520,000	34,634,000
Arkansas	5	11,791,000	11,434,000	9,411,000	66,413,000	57,434,000
Colorado	4	14,620,000	15,311,000	13,024,000	79,051,000	72,213,000
Cannecticut	2	19,697,000	20,965,000	19,657,000	101,329,000	88,211,000
Delaware	3	3,171,000	3,293,000	2,684,000	16,521,000	14,036,000
District of Columbia	2	7,162,000	6,998,000	6,456,000	37,575,000	34,007,000
Florida	6	18,183,000	16,249,000	18,530,000	120,785,000	120,389,000
Georgia	6	18,814,000	18,340,000	17,944,000	107,999,000	101,674,000
Idaho	5	5,525,000	5,980,000	5,241,000	26,271,000	21,082,000
Indiana	4	42,089,000	40,755,000	38,332,000	213,121,000	199,982,000
Iowa	3	32,075,000	34,957,000	30,042,000	182,040,000	145,150,000
Kansas	3	30,380,000	41,961,000	33,589,000	183,326,000	157,213,000
Kentucky	5	15,163,000	15,344,000	13,875,000	77,420,000	67,970,000
Louisiana	4	15,249,000	15,488,000	13,743,000	89,410,000	80,990,000
Maryland	4	14,266,000	16,008,000	14,890,000	79,685,000	72,440,000
Massachusetts	2	47,881,000	50,563,000	49,187,000	244,141,000	220,902,000
Michigan	3	74,214,000	74,985,000	78,700,000	368,330,000	353,504,000
Minnesota	3	32,838,000	38,261,000	31,929,000	177,456,000	152,479,000
Mississippi	5	†12,067,000	†11,718,000	11,683,000	†68,628,000	66,299,000
Missouri	2	37,080,000	40,018,000	34,055,000	203,889,000	174,613,000
Montana	5	10,000,000	8,778,000	9,851,000	37,830,000	32,291,000
Nebraska	4	17,798,000	19,716,000	17,128,000	106,929,000	111,493,000
Nevada	4	1,614,000	1,977,000	1,985,000	8,248,000	7,571,000
New Hampshire	4	5,712,000	6,524,000	6,111,000	25,904,000	22,016,000
New Jersey	2	49,590,000	50,031,000	51,165,000	248,381,000	225,286,000
New Mexico	5	4,458,000	4,966,000	4,133,000	25,127,000	20,033,000
North Carolina	5	20,343,000	21,329,000	19,208,000	120,042,000	121,875,000
North Dakota	3	11,914,000	11,302,000	10,935,000	53,060,000	57,050,000
Ohio	4	94,577,000	89,975,000	87,128,000	465,802,000	434,546,000
Oklahoma	4	26,382,000	31,206,000	28,831,000	154,688,000	144,402,000
Oregon	4	14,543,000	16,420,000	15,728,000	76,455,000	70,335,000
Rhode Island	2	7,200,000	7,877,000	7,134,000	39,765,000	33,371,000
South Carolina	6	10,349,000	9,642,000	9,851,000	56,484,000	55,061,000
South Dakota	4	12,237,000	12,605,000	11,623,000	63,894,000	54,566,000
Tennessee	5	18,804,000	19,327,000	17,042,000	99,574,000	86,250,000
Texas	4	67,881,000	73,008,000	68,178,000	380,711,000	354,884,000
Utah	3½	5,521,000	5,857,000	5,509,000	28,574,000	24,897,000
Vermont	4	4,287,000	4,951,000	4,738,000	17,918,000	16,172,000
Virginia	5	20,658,000	20,006,000	18,412,000	104,075,000	92,122,000
Washington	3	23,216,000	24,996,000	25,489,000	125,024,000	115,484,000
West Virginia	4	13,139,000	13,232,000	12,128,000	60,794,000	53,074,000
Wisconsin	2	41,164,000	42,491,000	39,961,000	191,784,000	159,843,000
Wyoming	4	3,136,000	3,743,000	3,681,000	15,695,000	14,251,000
Total		958,315,000	999,925,000	939,774,000	5,074,261,000	4,625,601,000
Daily Average		30,913,000	33,331,000	31,326,000	28,035,000	25,556,000
Increase over previous year:						
Amount of increase		.....	60,151,000	.....	448,660,000	.....
Percentage increase in daily average		.....	6.4%	.....	9.7%	.....
Illinois	3	88,502,000	87,935,000	.....	.....	.....
New York	2	137,715,000	142,510,000	.....	.....	.....

	Tax Per Gallon Cents	Quarter Ended March 31, 1930	Quarter Ended June 30 1930	Quarter Ended June 30 1929	6 Months Ending with June 30 1930	6 Months Ending with June 30 1929
California	3	295,461,000	347,735,000	307,518,000	643,196,000	595,288,000
Pennsylvania	4	204,100,000	206,486,000	225,500,000	410,586,000	373,431,000

† Estimated.

Stanley W. Mills Dies in Buffalo

BUFFALO, Sept. 2—Stanley W. Mills, well-known automotive engineer, associated with the Pierce-Arrow Motor Car Company, died Aug. 28 at his home in Buffalo, N. Y., after a protracted illness of several months.

Mr. Mills, who was born in England in 1882, came to the United States in early manhood. In 1917 he became affiliated with Pierce-Arrow as assistant chief truck engineer. Within a year he was promoted to chief truck engineer, a position he held until 1929. He then became passenger car chassis engineer, serving in this capacity until the time of his death.

Mr. Mills was credited with the introduction of dual valves in Pierce-Arrow truck engines.

Previous to becoming a member of the Pierce-Arrow organization he had been employed by the Fiat Motor Co., Cadillac Motor Car Co., and the Ford Motor Co.

Rubber Market Fairly Active

NEW YORK, Sept. 2—Crude rubber showed a fair amount of trading last week although prices continued to show little change from recent low levels, according to F. R. Henderson Corp.

Dispatches from rubber centers indicate a continued anxiety on the part of growers to have the British and Dutch governments cooperate on a plan to restrict production in order to bring the price up to a point where plantations can operate at a profit.

Stocks of crude rubber in London increased again last week to a total of 80,618 tons, with Liverpool stocks increased to 29,673 tons.

Arrivals at all ports of the United States during August are estimated at 34,125 tons.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Sept. 3—Fall buying by wholesalers and jobbers showed some signs of revival last week. Some reports indicate that trade in general was slightly better than in the middle of the month, but the improvement is not very striking. The approach of the reopening of the schools helped retail trade. The increase in the prices of farm products has strengthened purchasing power in the grain belt.

ELECTRICAL OUTPUT

Production of electricity during the week ended Aug. 23 amounted to 1,675,757 kilowatt-hours, which is approximately 2.8 per cent below that a year ago but 6 per cent above that two years ago.

CAR LOADINGS

Railway freight loadings for the week ended August 16 totaled 922,823 cars, which marks a decrease of 179,744 cars below those in the corresponding week last year and a decrease of 135,086 cars below those in the corresponding week in 1928.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended Aug. 23 amounted to 2,470,500 bbl., as compared with 2,463,550 bbl. for the preceding week and 2,966,350 bbl. for the corresponding week last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Aug. 30 stood at 83.3, as against 82.2 the week before and 83.8 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Aug. 27 were 29 per cent below those in the corresponding week last year.

STOCK MARKET

The stock market last week moved to higher levels, and the general tone was considerably improved. As the week progressed, the volume of trading increased. Most issues closed the week with net gains, some of which were quite large; but, nevertheless, 70 stocks reached new lows for the year. Call money remained at 2 per cent.

BROKERS' LOANS

Brokers' loans in New York City declined $26,000,000 during the week ended Aug. 27, bringing the total down to $3,102,000,000, as against $6,217,000,000 a year ago.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Aug. 27 showed increases of $4,000,000 in holdings of bills bought in the open market.

Steel Still Quoted at Consumers' Market

Broadening Activity Apparent at Beginning of Last Quarter

NEW YORK, Sept. 4—Steel market activities are slowly broadening. By next week it is expected that consumers will be giving more serious thought to their fourth-quarter requirements, and while no change in the hand-to-mouth policy of buying is looked for, the number of commitments is expected to increase from now on.

The market enters upon September with prices generally attractive to consumers. A few minor changes in the sheet market in the closing days of August can hardly be called further declines, being rather in the nature of equalization. Long terne sheets have been lowered to 3.55 cents, Pittsburgh, by the leading interest and some independents are quoting 3.45 cents. In the Chicago market, black sheets are now quoted at 2.50 cents, $1 per ton lower than previously, the Pittsburgh market having been at 2.45 cents for some weeks.

Strip steel prices are quotably unchanged. Mills are decidedly hungry for orders, and now that the general impression is that more business overhangs the market, competition has become still keener, keen as it was before.

Pig Iron—A fair tonnage of foundry and malleable was taken by automotive foundries previous to the Labor holiday, all of it in small lots. Some of the blast furnaces now idle are being prepared for resumption of production when stock piles have been worked lower and demand shows further improvement. Quotations are unchanged.

Aluminum—The market continues dull. In some of the world's markets the effect of competition by cheap copper is beginning to make itself sharply felt, and news from London is to the effect that the Norwegian plants, one of which is owned by American aluminum interests, plan sharp curtailment of operations. Of 5,731,000 lb. of aluminum exported from Canada in July, only 50,000 lb. came to this country, nearly 5,000,000 lb. going to Japan.

Copper—Quiet and unchanged.

Tin—End of the month statistics reflected light consuming demand in the United States, and tended to arrest any marked upward movement in price.

Lead—Dull and unchanged.

Zinc—Mine operators are pressing for higher ore prices, and this acts as a prop for values although demand for metal is very light.

Motor Service Begun in Africa

WASHINGTON, Sept. 3—What is described as the world's longest motor taxi route has recently been inaugurated in Africa, states a report to the Automotive Division, Department of Commerce, from Assistant Trade Commissioner DuWayne G. Clark, Johannesburg, South Africa. This service, which is known as Trans-African Motor Safaris, has been started to carry tourists from the Juba terminus of the Nile steamers to Cape Town. The entire trip is scheduled to take about eight weeks.

Three British Manufacturers Reduce Prices; Morris Now Has Cheapest Six-Cylinder Car

By M. W. Bourdon

LONDON, Sept. 2 (*by cable*)—Introductions of new models by three prominent British automobile manufacturers have been accompanied by substantial price reductions. The manufacturers involved are Morris, Rover and Wolseley. Morris has cut prices on all its models and now has the lowest priced six in the British market. All the 1930 models of this company are continued with no radical changes in design, but the coachwork shows marked improvement. Radiators are higher and chassis lubrication through a system of grouped nipples is provided. Safety glass and tilting beam headlights are standard equipment.

The new light six, termed the Morris Major, has the same two-liter engine as the Morris Oxford six. Features are three-speed transmission, 105-in. wheelbase, 48 in. track. The car is virtually a six-cylinder version of the Morris Cowley four, demand for which seems to continue unabated.

Prices on the sedans of continued models in the Morris line are as follows: the 8-hp. Minor fabric job is priced at £135 instead of £140, metal body, at £140 instead of £149. The 12-hp. Cowley, furnished in metal only, is priced at £185 instead of £195. The 15-hp. Oxford six in fabric is £265 instead of £285 and in metal is £285 instead of £299. The 18-hp. Isis six, furnished in metal only, is £340 instead of £385. The new fixed roof metal sedan on the Oxford six chassis is £275. The new light six with two-door metal sedan body is priced at £215, with four-door sedan at £225. The present nearest price competitor of the Morris light six is the British Standard, 15-hp. four-door sedan, announced last week in *Automotive Industries* and which sells for £245.

Wolseley, owned by Morris, introduces a 16-hp. six-cylinder car priced at £285 for the five-passenger fabric sedan body.

The car is equipped with safety glass and radiator shutters. It has overhead valves, Lockheed brakes and a three-speed transmission. Prices on the Morris line have been reduced an average of 25 per cent from prices on the preceding models.

Substantial price reductions also characterize the Rover program for 1931. The four-cylinder Model 10 is priced at £189, compared with the former price of £252, with new features in the shape of a bigger Weymann fabric sedan body and a 10 per cent increase in power.

The two-liter six-cylinder fabric sedan is reduced to £298 from £369, while the metal-bodied sedan is reduced to £298 from £408. The 20-hp. six-cylinder car is reduced from £438 to £398.

The new model is a light 20-hp. chassis, adapted for four-passenger bodies. Its price is £358. All models of the Rover except Model 10 have four-speed transmission with silent third speed, combined air cleaner and intake manifold silencer, grouped lubrication, higher radiators, safety glass all around, fuel pump and lower chassis frames. The body work is 3 in. wider.

Automatic 'Chute Patented

WASHINGTON, Sept. 3—An automatic parachute has been developed in Canada and patented there and in the United States, according to Canadian information forwarded to the Department of Commerce by Trade Commissioner Harvey A. Sweetser at Toronto.

It is claimed that this parachute, weighing 1¼ lb., strapped on the shoulder, may be automatically released, thus obviating the serious difficulties in cases where the jumper fails to release the parachute.

Motor Stocks Decline

NEW YORK, Sept. 2—Stocks of seven of the leading automobile manufacturers showed a decline in market price of 1.6 per cent during the month of August, contributing their share to a decline of seven-tenths per cent in a total of 100 stocks chosen from 13 classifications, according to Frazier Jelke & Co., New York bankers. These seven stocks showed a total decrease in price of $40,804,000 during the month.

Industries which exceeded the motor industry in the amount of decline in price include electrical equipment, which declined 6.2 per cent, mines 6.1 per cent, oils 3.5 per cent and amusements 2.5 per cent.

Stocks which increased in value during the month include merchandising units, which increased seven per cent, chemical which increased 6.4 per cent, food which increased 2.7 per cent and industrials which increased 1.6 per cent.

Unit Corp. Earns Dividend

CHICAGO, Sept. 2—Earnings for the first six months of 1930 of the Unit Corporation of America and subsidiaries were $142,649.91. This compares with $268,616.60 for the first half of 1929. The dividend requirement for the first six months of 1930 was $138,688.

Ford of Canada Sales Hold Up

MONTREAL, Sept. 2—Sales of the Ford Motor Co. of Canada, Ltd., thus far in 1930 practically equal those for the same period of 1929, according to E. F. Millard, advertising manager.

Westinghouse Unit Making Farm Tractors

Product is Crawler Type With 40 Hp. Engine

MILWAUKEE, Sept. 2—The National Brake & Electric Co., Milwaukee, a subsidiary of Westinghouse, has entered the farm tractor field, it is announced. Production is just getting under way. Until now the company has been building a line varying from tiny, portable air compressors to large gasoline locomotives.

The new tractor is of the crawler type, with a motor rated at 40 hp., and weighs 5200 lb., developing a drawbar pull equal to its own weight. It will sell at $1,450, f.o.b. Milwaukee. It has high clearance and low overall height. The engine is set well forward to place the weight on the front end to give greater pulling force. It is designed for construction and logging work as well as farm service. Under normal conditions it is a four-plow machine. The tractor is undergoing the University of Nebraska standard tests for an official rating. Other products of the National Company include hydraulic presses, car washing systems, farm water and gas outfits and other similar utilities. P. L. Crittenden is vice-president and general manager.

Commercial Credit Declares

BALTIMORE, Sept. 2—At a meeting of the Board of Directors of Commercial Credit Co. last week, regular quarterly dividends on the 6½ per cent and 7 per cent first preferred stocks, 8 per cent Class B preferred and the $3 Class A convertible stock were declared. The board also declared the regular 50 cents a share dividend on the common stock. These dividends are payable Sept. 30, 1930, to stockholders of record Sept. 10, 1930.

Completes 10,000th Fuel Pump

PHILADELPHIA, Sept. 2—As an indication of the progress of the high-speed Diesel engine it is of interest to note that the Robert Bosch Company recently completed its 10,000th fuel injection pump. The first experimental pump was built in 1925 and in 1927 regular production was begun. In September, 1928, the thousandth pump was completed. Not all of these pumps are being used on what may be called automotive Diesels, and it is stated that the 10,000th pump was designed for use on a single-cylinder engine with a piston displacement of 1220 cu. in.

Kelsey-Hayes Declares

DETROIT, Sept. 2—Kelsey-Hayes Wheel Corp. has declared a dividend of 50 cents on common stock payable Oct. 1, record Sept. 19.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Lwow, Poland, Sample Fair....September
London, England, Olympia Show..October
Dallas, Southwestern Automobile, Oct. 11-26
National Roadbuilders' Show and Convention, St. Louis .....Jan. 10-16
International Garage Exposition, Berlin, Germany .....May 9-Aug. 9

CONVENTIONS

Fifth International Air Congress, Auspices Royal Aero Club, The Hague, Holland .....Sept. 1-6
American Chemical Society Fall Meeting, Cincinnati .....Sept. 8-12
Steel Founders' Society Meeting, Pittsburgh .....Sept. 10-11
Eastern States Exposition, Springfield, Mass. .....Sept. 14-20
A. S. M. E. Machine Shop Practice Meeting, Chicago .....Sept. 22-24
A. S. M. E. Iron and Steel Division Meeting, Chicago .....Sept. 22-26
American Institute of Mining and Metallurgical Engineers (Metals Div.), Chicago .....Sept. 22-26
American Welding Society Meeting, Chicago .....Sept. 22-26
Society for Steel Treating Meeting, Chicago .....Sept. 22-26
American Gear Manufacturers Association, Semi-Annual Meeting, Hotel Clifton, Niagara Falls, Ont., Canada .....Sept. 29-Oct. 1
Annual Show Drawing, National Automobile Chamber of Commerce, New York .....Oct. 2
National Safety Council, Annual Safety Congress, Pittsburgh...Sept. 29-Oct. 4
American Institute of Mining and Metallurgical Engineers (Petroleum Div.), Tulsa .....Oct. 2-3
Pennsylvania Automotive Association Meeting, Reading, Pa. .....Oct. 6-7
A. S. M. E. Petroleum Division Meeting, Tulsa, Okla. .....Oct. 6-8
Sixth International Road Congress, Washington, D. C. .....Oct. 6-11
Exhibition — American Roadbuilders Association, Washington, D. C., Oct. 6-11
Society of Automotive Engineers, Production, Book-Cadillac Hotel, Detroit .....Oct. 7-8
A. S. M. E. General Meeting, French Lick Springs .....Oct. 13-15
Society of Industrial Engineers, Washington, D. C. .....Oct. 15-17
Society of Automotive Engineers, Transportation, Pittsburgh..Oct. 22-24
Motor and Equipment Association, Convention, Cleveland .....Nov. 10-14
N.S.P.A. Convention, Cleveland, Ohio, Nov. 17-21
Annual Asphalt Paving Conference, Memphis, Tenn. .....Dec. 1-5
First International Aerial Safety Congress, Paris, France .....Dec. 10-23
Society of Automotive Engineers, Annual Dinner, New York .....Jan. 8
Society of Automotive Engineers, Annual Meeting, Detroit ...Jan. 19-23
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco..Feb. 16-20

SALONS

Chicago, Drake Hotel .....Nov. 8-15
New York, Commodore Hotel, Nov. 30-Dec. 6
Paris, France .....Oct. 2-12
Prague, Czechoslovakia .....October
Paris, France, Salon (Commercial Vehicles) .....Nov. 13-23
Brussels, Belgium, Salon .....Dec. 6-17

RACES

Italy (Grand Prix) .....Sept. 7
France (Grand Prix) .....Sept. 21

Brockway Declares Dividend

NEW YORK, Sept. 3—Brockway Motor Truck Corp. has declared regular quarterly dividend of $1.75 on 7 per cent preferred stock, payable Oct. 1 to stockholders of record Sept. 10.

Gardner Announces Improved 1931 Line

Is Straight Eight With Basic Features of 1930 Car

ST. LOUIS, MO., Sept. 2—The Gardner Motor Co., Inc., has announced an improved line of straight eights for 1931. The chassis is known as Model 148 and is furnished with bodies of five styles, including a roadster, phaeton, brougham, sedan and sport sedan. More than 25 color combinations in hand-polished lacquers with upholstery to match are being offered at prices ranging from $1,795 for the roadster to $1,895 for the sedan.

Closed models are upholstered in Chase mohair; seat backs and cushions are pleated, and have form-fitting springs and real hair padding. Overstuffed upholstery is used throughout. The roadster is trimmed in leather. Window openings of inclosed models are incased in one-piece frames with American walnut finish and the same finish is used for the instrument board and reflector panel.

A chrome-plated grill adorns the front of the 1931 Gardners and protects their radiators. Three-inch molding is used to contrast the body colors, and runs entirely around the body and in a sweeping curve to the center of the cowl, where it terminates in a pointed design at the cowl band.

Interiors of the closed models are finished in a variety of color schemes. Quarter windows are fully curtained. Arm rests on front doors are a comfort feature. Butler finished hardware for the interiors is used throughout.

From a mechanical standpoint the 1931 Gardners are basically the same as the company's 1930 line. Mechanical changes designed to increase riding and driving comfort include rubber mounting for the engine, rubber mountings for the spring shackles which require no lubrication and remain silent, and a four-speed transmission. The powerplant is the Gardner-Lycoming eight-in-line yellow-head engine, which is of the L-head type, with a bore of 2⅞ in. and a stroke of 4¾ in. The displacement is 246 cu. in.

Campbell Sees Officials

DETROIT, Sept. 2—Wallace R. Campbell, president and treasurer of Ford Motor Company of Canada, left for Ottawa Wednesday night of last week to interview officials of the Canadian government in connection with New Zealand trade relations. He was accompanied by E. R. Musselman, customs chief of the company. The Ford officials will ask the government to take necessary steps to avoid threatened withdrawal by the New Zealand government of its preferential tariff for Canadian motor cars.